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Volume ~~III~~.

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Revised December 1969

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GENESEE RIVER BASIN COMPREHENSIVE STUDY

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HYDROELECTRIC POWER

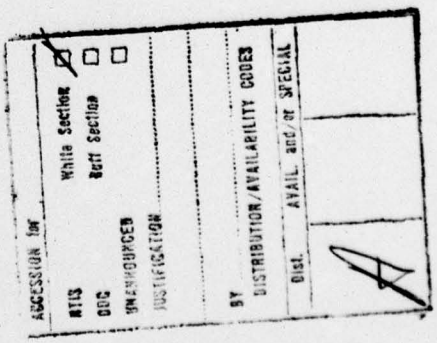
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GENESEE RIVER BASIN COMPREHENSIVE STUDY

APPENDIX L - HYDROELECTRIC POWER

GENERAL

1. INTRODUCTION

Hydroelectric power was included in the authorizing resolution among the resources to be considered in the comprehensive study of the Genesee River basin. This appendix reviews prior reports on hydroelectric power development for the basin, describes the existing power supply and market characteristics, establishes probable future power supply requirements, and provides data for feasibility studies of selected plans for power generation at multiple-purpose reservoir sites. Plate L-1 shows the Genesee River basin, existing power facilities and the locations of reservoir sites included in inventory and appraisal studies.

2. COORDINATION

A task group of representatives of interested Federal and state agencies was appointed by the Genesee River Basin Coordinating Committee to make hydroelectric power studies for the report. Agencies appointed and specific work assignments follow.

a. Federal Power Commission. The New York Regional Office of the Federal Power Commission prepared a report on power supply and requirements for the Genesee River basin and also furnished capacity and energy values used to derive power benefits for this study. Staff members also made on-site inspections and provided technical assistance in the definition and analysis of plans for future hydroelectric power developments in the basin. The data prepared by the Commission are included as a supplement to this appendix and are summarized in appropriate paragraphs below.

b. Department of the Interior, Office of Water and Power Development. The Office of Water and Power Development is responsible for financial feasibility studies, repayment and rate schedules for marketing hydroelectric power from Federally-constructed projects. Technical assistance in site screening studies was also provided.

c. Department of Agriculture, Soil Conservation Service. The Soil Conservation Service is interested in improving the annual distribution

of yields through upstream impoundments. They also participated in task group consideration of all phases of power development.

d. New York State Conservation Department, Division of Water Resources. The Division provided coordination with other state agencies contributing to the study and also cooperated in other phases of the power studies.

e. Corps of Engineers. The Corps of Engineers was designated chairman agency for the task group and made responsible for hydrologic and engineering studies to identify plans of power development with sufficient merit for inclusion in final basin plan formulation. Preparation of the power appendix was also assigned to the Corps.

3. SCOPE

a. Geographic. All projects investigated for potential power development lie within the watershed of the Genesee River. While most of the electric energy consumed in the basin service area is generated within the area, systems generating in other areas have high-voltage lines crossing the basin and there is a high degree of interconnection among the systems. System interconnections and load centers outside the basin are considered to the extent necessary for determining power market characteristics and marketing criteria.

b. Functional. Studies to establish future power requirements included consideration of hydro, conventional steam, nuclear and other modes of electric power generation. Studies for power facilities to assist in meeting future requirements include hydroelectric generation at multiple-purpose sites considered as possible elements in a basin plan, and also include increased generation at downstream facilities from both major storage and upland reservoirs without potential for on-site generation. Pumped storage developments unrelated to multiple-purpose sites were not considered. Pumped storage facilities as adjuncts to conventional facilities, or as mutually exclusive alternatives, were considered where necessary to determine best usage of available storage.

c. Degree of refinement. This appendix presents results of regulation studies and estimates of costs and benefits made in sufficient detail for screening of projects and combinations of projects. Studies are preliminary in nature and provide the basis for selection of elements meriting study of the intensity required for survey reports. Final project designs and cost estimates, and economic analyses including allocations of costs and benefits, are presented in the appropriate appendices and comprise those multiple-purpose projects indicated by preliminary studies to be justified for construction within the 10 to 15 year period following report completion.

4. REVIEW OF PRIOR REPORTS

Hydroelectric power is generated by a private utility in three plants utilizing the falls of the Genesee River at Rochester and in three other small plants in the upper basin above Mt. Morris, New York. The following paragraphs summarize conclusions reached in certain investigations made since 1900 by state and Federal agencies considering further development of the hydroelectric power potential remaining in the basin.

a. Progress Report on Water Power Development, by State Water Supply Commission of New York, 1908. The Commission study found 12 possible dam and reservoir sites on the Genesee River and tributaries above Portage. Amount of storage available was found to be inadequate for either flood control or power and total costs greatly in excess of potential benefits. The study also considered a large dam and reservoir on the river at the Portage site for which feasibility studies were not made but which was recommended for further study.

b. Survey Report on Genesee River, New York, by Corps of Engineers, 1941. In the report, published as House Document No. 615, 78th Congress 2nd Session, construction of a dam on the Genesee River near Mt. Morris was recommended by the District Engineer as the only reservoir project economically justified for the basin at that time. Construction was authorized by Congress and Mt. Morris Dam began operating for flood control in November 1951. Alternate plans investigated included installation of about 2,000 kilowatts of hydroelectric capacity in Mt. Morris Dam, and a dam at the Portage site to develop about 25,000 kilowatts. After consideration of comments by state and other Federal agencies, the flood control reservoir at Mt. Morris was concluded to be most suitable as the initial step in any comprehensive plan for water resources development in the Genesee River basin. Further consideration of the Portage site was recommended should the need for a greater degree of water conservation or flood control be established.

c. Plan of Development for Genesee River Basin, by Federal Power Commission, 1943. This report, in the form of a memorandum to the Chief of Engineers in response to his request for comment on the survey report, presented a plan to develop as fully as possible the hydroelectric power potential of the basin. Flood control and recreational use of reservoirs was also proposed. In the upper basin there would be Genesee River reservoirs with power plants at Stannard - 4,000 kw; Portage - 80,000 kw; and Mt. Morris - 20,000 kw. Reservoirs without power facilities would be required on the river near Belfast and at the Summit site on Black Creek in Allegany County. In the lower basin,

four projects in the Canaseraga Valley were estimated to have power capability of 12,000 kw. A re-regulation reservoir on the river above the falls at Rochester and redevelopment of existing power facilities at the falls would also have been included in the Commission plan. The Commission recommended that the proposed Mt. Morris project be modified to become part of the total plan of development outlined in the memorandum.

d. The Resources of the New England - New York Region, by New England - New York Interagency Committee, 1954. The Genesee River basin was made the subject of one chapter of this regional study. The most favorable plan for hydroelectric power development was found to consist of the five upper basin sites presented in the FPC report summarized in the preceding paragraph, plus a modified plan for re-development of the falls at Rochester. The Stannard, Summit, and Belfast reservoirs would provide regulation only, while peaking plants designed for operation at load factors of 20 percent during the critical low flow period would be included at the proposed Portage damsite and as an addition to Mt. Morris Dam. Installed capacities would be 82,000 kw at Portage and 40,000 kw at Mt. Morris. Economic analysis of this single-purpose power plan indicated that the annual benefits would be less than one-half of the annual costs for the necessary projects and further consideration of these projects for power was not recommended.

5. SERVICE AREA UTILITIES

Electric service in the basin is provided by five privately-owned electric utilities, seven municipal systems, one state-owned power generating and transmitting authority and one rural electric cooperative. Plant locations and transmission lines are shown on plate 1 and a listing of utilities follows:

Private utilities

Rochester Gas and Electric Corporation
Niagara Mohawk Power Corporation
New York State Electric and Gas Corporation
Pennsylvania Electric Company
West Penn Power Company

State-owned utility

Power Authority of the State of New York

Municipal utilities

Village of Andover Electric Department
Village of Angelica Light and Power Board
Village of Bergen Electric Department
Village of Castile Electric Utility
Village of Churchville Electric Department
Village of Silver Springs Electric Department
Village of Wellsville Water and Light Department

Rural electric cooperative

Tri-County Rural Electric Cooperative, Inc., (Pennsylvania)

Rochester Gas and Electric Corporation provides most of the electric power for the service area and marketed more than 90 percent of the energy requirements in the year 1968. This utility, the Power Authority of the State of New York, and the other two listed private utilities operating in New York State are interconnected among themselves and with their other neighbors at numerous points by high voltage ties. Operations are highly coordinated and are expected to become increasingly more coordinated in the future. This factor is important in considering the market for future hydroelectric power which might be generated in

the basin. Further details concerning the basin utilities and interconnections can be found in Supplement A to this appendix.

6. POWER SUPPLY FACILITIES

Of the private utilities operating in the Genesee basin, only Rochester Gas and Electric Corporation has generating facilities located in the basin. The others supply their respective portions of the market area from distant sources of power. Similarly, the Power Authority of the State of New York with plants at Niagara Falls and Massena, N. Y., provides all power requirements for the municipal systems and sells power to other utilities in the state. Wellsville Water and Light Department owns a small steam-electric plant which was retired in 1966. Power sources outside the area also supply the Tri-County Rural Electric Cooperative in the Pennsylvania portion of the basin. Generating capacity located in the basin service area is shown in table L-1.

TABLE L-1. Installed generating capacity (1)

Company	Plant No.	Location	Type	Installed capacity in kilowatts
RG&E (2)	2	Rochester, N.Y.	Hydro	6,500
RG&E	5	Rochester, N.Y.	Hydro	38,250
RG&E	26	Rochester, N.Y.	Hydro	3,000
RG&E	160	Mt. Morris, N.Y.	Hydro	340
RG&E	170	Wiscoy, N.Y.	Hydro	1,080
RG&E	172	Mills Mills, N.Y.	Hydro	220
			Total hydro	49,390
RG&E	7	Greece, N.Y.	Steam	252,600
RG&E	3	Rochester, N.Y.	Steam	206,200
RG&E	8	Rochester, N.Y.	Steam	8,000
RG&E	9	Rochester, N.Y.	Steam	3,000
WW&L (3)	-	Wellsville, N.Y.	Steam	1,500 (4)
			Total steam	471,300
			Total all plants	520,690

(1) As of 31 December 1968.
(2) Rochester Gas and Electric Corporation.
(3) Wellsville Water and Light Department.
(4) Retired in 1966.

7. PAST AND FUTURE REQUIREMENTS

Annual use of electric energy in the Genesee River basin has nearly doubled in each decade from 1940 to 1960 and the same rate of growth has been used to estimate requirements to the year 1980. For the more distant future to the year 2020, estimates of power requirements have been made on the basis of expected rates of growth for the nation as a whole.

TABLE L-2. Past and estimated future power requirements

Year	Energy (million kwh)	Peak demand (thousand kw)	Load factor (%)
1940	534	118	51.5
1960	1,999	428	53.2
1964	2,655	527	57.4
1968 (1)	3,780	716	60.0
1980	6,800	1,300	60.5
2000	18,000	3,370	61.0
2020	47,800	8,800	62.0

(1) 1968 and prior years actual; 1980-2020 estimated values.

8. CAPACITY ADDITIONS FOR FUTURE LOADS

Estimated growth in power requirements, when compared with existing capacity, expected retirements of capacity, scheduled additions and necessary reserves will provide an indication of future capacity additions needed for power supply in the basin. Changes in the technology and economics of energy production will continue to occur and estimates of required additions are made only to the year 1990. Summary for the Genesee basin is shown in table L-3.

TABLE L-3. Load and capacity summary

Item	Unit	1980	1990
Total required capacity (1)	mw	1,560	2,480
Capacity existing in 1968 (2)	mw	520	520
Expected retirements	mw	92	182
Scheduled additions	mw	559	559
Total capacity available	mw	987	897
Additional capacity required	mw	573	1,583

(1) Including required reserves.
(2) Includes hydroelectric and fuel-electric capacity.

In updating the National Power Survey the Federal Power Commission found that capacity additions planned by New York utilities for installation in the Genesee River basin before 1970 would provide sufficient capacity for the expected load in that year. For later years, the program would be tentative and subject to change. More complete information on supply and requirements can be found in Supplement A from which the data in this section was abstracted.

9. LIMITATIONS OF THE BASIN

a. Geographic. In the lower, northern-most portion of the basin, valleys are broad with relatively flat stream gradients. There are few good dam sites and gross heads for hydroelectric power would generally be low. In 67 miles between Mt. Morris Dam and Lake Ontario, the river falls 330 feet of which some 230 feet occurs in the vicinity of the falls at Rochester and is developed in three run-of-river plants with limited ponding. The upper basin is characterized by steeper stream slopes, more rugged terrain and narrow valleys. Except in the reach below Portageville, where the river drops over 300 feet in falls and rapids at the entrance to the gorge through Letchworth Park, potential main stem and tributary impoundments could provide gross heads for power of 50 feet to about 150 feet. A number of the sites more favorable for dam construction would have drainage areas of less than 50 square miles. Profiles of the river and of representative tributaries are shown on plate L-2.

b. Hydrologic. Stream flows in the Genesee River basin are notably variable, both seasonally and annually. At Portageville, the sum of the average runoff in March, April and May is 8.52 inches or 51 percent of the average runoff for the year. Monthly runoff in July, August and September totals 1.16 inches or 7 percent of the yearly average. At the same station, the maximum annual runoff in 52 years of record was about 2.6 times the minimum and about 1.7 times the average runoff. Similar degrees of variability can be expected at other locations on the river and on the tributaries. Records of stream flow and an analysis of variability can be found in appendix "E," Hydrology and appendix "H," Water Supply and Water Quality Management.

c. Other constraints. The existing Federal dam at Mt. Morris is a single-purpose project providing slightly less than 6 inches of flood control storage for protection of the lower Genesee River, a degree of protection which should not be reduced. Conversion of any portion to other use, such as a permanent pool for recreation or power, would require that equivalent flood control storage be provided elsewhere. Mt. Morris reservoir lies wholly within Letchworth State Park and must be operated with full consideration for the outstanding scenic attractiveness which is the park's most valuable asset. The three falls of the Genesee River below Portageville contribute to scenic values in the park. River discharges not detrimental to these values, particularly during the recreation season, would be a requirement

for flow regulation by any upstream impoundments. Project works proposed for location within park boundaries would require virtually complete concealment, control of access, and other measures which would assure compatability with park standards and objectives.

10. INVENTORY OF SITES

a. Procedure. Map studies and field reconnaissance identified 14 major reservoir sites in the basin believed to have potential for multiple-purpose use. Locations of sites selected are shown on plate L-1. Reservoir area-capacity curves and preliminary estimates of dam and reservoir costs were developed by the site-screening task group and were made available to other task groups with responsibility for one or more project purposes. For screening, each dam was designed to provide the maximum development of storage available at the site consistent with reasonable freeboard allowance and avoidance of excessively long or costly structures. Site capabilities were based on the evaluation of each reservoir acting individually with all available storage allocated to the single purpose of power generation or, as an alternative, for flow regulation for possible downstream use. The existing Mt. Morris reservoir was not included in the inventory since it would necessarily be included in later, more detailed plan formulation studies. Yield studies, site capabilities derived, and results of preliminary evaluation studies are summarized in paragraphs immediately following.

b. Storage-yield relations. Mass curves, in the form of cumulative deviations from mean flows, were developed for selected United States Geological Survey gaging stations in the Genesee River basin and storage-yield relations for reservoirs to be evaluated were then derived. Gaging station data and periods used for mass curves are listed in table L-4.

TABLE L-4. Gaging station data for mass curves

Gaging station	Period (3)	Drainage area (sq mi)	Mean monthly discharge (cfs/sq mi)	Min. day (cfs)
Oatka Cr. at Garbutt, N. Y. (1)	Oct 1945-Sep 1963	208	0.955	16
Honeoye Cr. at Honeoye Falls, N. Y. (1)	Oct 1945-Sep 1963	197	0.572	0.1
Keshequa Cr. at Sonyea, N. Y. (2)	Oct 1915-Sep 1932	69	0.705	0.1
Canaseraga Cr. near Dansville, N. Y. (1)	Oct 1915-Sep 1963	153	0.966	11
Genesee R. at Portageville, N. Y. (1)	Oct 1907-Sep 1963	982	1.237	20
Genesee R. at Scio, N. Y. (1)	Jun 1916-Sep 1960	309	1.245	6.9

(1) Water-stage recording gage.
(2) Staff gage.
(3) Period used for developing mass curve.

Storage yield curves are shown on plate L-3. In computing reservoir yields, drainage area ratios were used for conversion from gages to site locations. The Scio gage was used for upper basin reservoirs above Portage and an additional runoff factor based on rainfall data was used to obtain estimates of firm yield for each of these sites. The factor ranged from 0.85 for the Vandermark Creek site to 1.02 for the Stannard site. Storage-yield per square mile relationships at the gages were used without adjustment for lower basin sites and for the Portage site.

c. Site capabilities. Two levels of reservoir storage were considered in establishing power capabilities of sites. The first level allocated all storage above an estimated 100-year sediment pool in each site to flow regulation. The firm yield which could be provided for the period of record of the relevant gaging station

was then determined. The second level allocated all storage between 100 percent of gross head and 60 percent of gross head at each site to at-site power generation and the firm yield which could be provided on this basis was established. Either storage allocation would provide regulated flows which could be used downstream for power or other purposes, and the assumed limitation on drawdown for power generation would also provide a minimum pool available for recreation or other on-site use. However, no specific allocation of storage was made for flood-control, water-supply, or other purposes so that multiple-purpose use of sites, when considered in later phases of the basin studies, is likely to result in reduced capabilities for power. Future conventional hydroelectric power installations were designed to operate at a load factor of 10 percent during the critical period, and site capacities were computed on this basis. No pumped storage projects meeting the adopted requisites of high head and integral relationship to multiple-purpose sites were found. An exception, involving combined use of the Portage and Mt. Morris reservoirs, was deferred for more detailed study and is presented in later sections of this appendix. Pertinent yield and power data developed for the appraisal are shown in table L-5.

d. Estimates of cost. Dam and reservoir cost estimates were prepared for general screening purposes and were available as indexes of storage costs for power. Benefits and costs for other uses in multiple-purpose operation were not estimated and no cost allocations were made in screening studies. Annual charges for dam and reservoir were based on 100-year life and an interest rate of 3-1/8 percent. Investment costs per kilowatt of installed capacity were based on generalized estimates related to gross head and unit sizes, and were derived essentially from Federal Power Commission curves of first cost for powerhouse and equipment. Interest during construction over a two year period was included in investment costs for each site. Because extensive tunneling and additional special items would be required to develop the Portage site, generalized curves were not used and a separate cost estimate was made. Construction period for this site was assumed to be four years. Annual charges for power facilities included interest and amortization over 100 years at 3-1/8 percent on the investment and on present worth of power features assumed to require replacement in 50 years. Also included in annual charges for power were the following:

Item	Annual charge as percent of investment
Operation and maintenance	1.2
Interim replacements	0.2
Administration	0.4

Table L-5. Inventory of site capabilities

Site	Stream	Drainage area (sq mi)	Total storage at spillway crest (acre-ft)	Total storage at spillway crest (inches)	Spillway crest elev. (ft)	Dead storage(1) (acre-ft)	Flow regulation: Active storage (acre-ft)	Flow regulation: At-site yield Gross(2) (cfs)	Flow regulation: At-site yield Net(3) (cfs)	Power generation: Active storage(4) (acre-ft)	Power generation: Gross head Max. (ft)	Power generation: Gross head Min. (ft)	Power generation: At-site yield Gross(2) (cfs)	Power generation: At-site yield Net(5) (cfs)	Power generation: Capacity(7) Max. head (kw)	Power generation: Capacity(7) Min. head (kw)	Power generation: Annual energy (mwh)
Stannard	Genesee R.	168	93,500	10.4	1620	2,500	91,000	171	164	61,000	80	48	143	125	8,000	4,800	5,500
Chenunda	Chenunda Cr.	29	20,000	13.6	1690	400	19,600	29	28	15,400	118	71	28	25	2,000	1,200	1,300
Vandermark	Vandermark Cr.	20	20,200	18.9	1690	300	19,900	19	18	14,600	111	67	18	15	1,200	700	790
Angelica	Angelica Cr.	54	45,700	15.8	1590	2,000	43,700	52	49	36,000	120	72	50	44	3,700	2,100	2,400
Summit	Black Cr.	20	20,000	18.8	1700	1,000	19,000	19	14	9,000	44	26	16	9	300	150	320
Belfast	Genesee R.	580	145,000	4.7	1370	18,000	126,000	302	292	117,000	100	60	295	245	17,000	10,000	19,500
Cold	Cold Cr.	40	23,800	11.2	1390	700	23,100	38	37	16,800	115	69	35	31	2,500	1,500	1,700
Rush	Rush Cr.	39	18,600	8.9	1376	600	18,000	34	33	13,200	132	79	35	31	2,900	1,700	1,800
Wiscoy	Wiscoy Cr.	108	43,200	7.5	1410	500	42,700	88	86	32,400	150	90	71	62	6,600	3,900	5,800
Portage	Genesee R	985	283,000	5.4	1190	32,000	251,000	695	680	251,000	493	434	695	510(6)	176,000	155,000	197,000
Tuscarora	Keshequa Cr.	68	46,000	12.7	810	2,300	43,700	46	44	35,500	135	81	38	32	3,000	1,800	1,900
Poag's Hole	Canaseraga Cr.	89	56,000	11.8	988	3,000	53,000	73	71	37,000	193	116	63	55	7,500	4,400	5,200
Honeoye	Honeoye Cr.	189	13,600	1.4	795	800	12,800	32	30	11,200	51	31	19	15	500	300	910
Oatka	Oatka Cr.	188	44,500	4.4	720	800	43,700	115	112	28,600	95	57	64	38	2,700	1,500	4,500

(1) Estimated sediment storage required for 100 years.

(2) Minimum regulated flow obtainable in critical year with given storage.

(3) Gross yield less estimated losses.

(4) Storage between spillway crest elevation and drawdown to 60 percent of maximum gross head.

(5) Gross yield less estimated losses and continuous releases not available for peak power use.

(6) Flow available for power diversion after losses and releases for Genesee River falls.

(7) Capacity at 10 percent load factor.

A summary of estimated costs is included in economic data for the inventory given in table L-6.

e. Power values and benefits. Hydroelectric power benefits were based on annual values for capacity and energy measured by the cost of an equivalent supply from the most likely alternative source. In the Genesee River basin, this source was assumed to be a privately-financed steam plant near Rochester, New York. For cost allocation purposes, and for the so-called "comparability test" which establishes an upper limit for the separable cost of including power in a multiple-purpose project of the Corps of Engineers, Federal financing of the alternative source of power was assumed. Preliminary values for at-site power, supplied by the Federal Power Commission were as follows:

	Capacity value $/kw/yr	Energy value Mills/kwh
Private financing	18.00	2.3
Federal financing	9.90	2.3

The above values were derived specifically for preliminary studies of the Portage site and for Mt. Morris Dam. However, their use for other sites without adjustment for location was considered to provide adequate data for inventory purposes. Cost and benefit data for each site are shown in table L-6. The table also shows the ratio of annual benefits to annual specific power costs and the "comparability" ratio, that is, the ratio of annual benefits based on costs of a Federally-financed alternative project to the annual specific costs for the project under consideration.

11. RESULTS OF APPRAISAL

a. Generation. The economic data of table L-6 show that power generation at Portage would have a comparability ratio of unity and a ratio of annual power benefits to specific costs of about 1.7 for conventional units at a load factor of 10 percent. Of the remaining sites in the inventory, Wiscoy and Poag's Hole have the most favorable ratios of power benefits to specific costs. Comparability ratio for each of these sites would be 0.9 and it would be 0.8 or less at the other locations. Except at Portage, power generation at any site in the inventory could only be an incidental consideration in projects developed primarily for other purposes.

TABLE L-6. Economic data for inventory

Site	Dam and reservoir costs: Invest.(1) ($1,000)	Annual(2) ($1,000)	Specific power costs: Invest. (1) ($/kw)	($1,000)	Annual (3) ($1,000)	Annual power benefits (4): Dep. capac. @$18/kw ($1,000)	Avg. energy @2.3 mls/kw-hr. ($1,000)	Total ($1,000)	Ratio of benefits to spec. costs	Annual power values (Based on Federal financing) (5): Dep. capac. @$9.90/kw ($1,000)	Avg. energy @2.3 mls/kw-hr. ($1,000)	Total ($1,000)	Compara-bility ratio (6)
Stannard	19,800	706	206	1,650	95	86	13	99	1.04	47	13	60	0.6
Chenunda	14,100	511	175	351	20	22	3	25	1.2	12	3	15	0.7
Vandermark	9,300	343	181	217	12	12	2	14	1.2	7	2	9	0.7
Angelica	16,600	597	175	650	38	38	5	43	1.1	21	5	26	0.7
Summit	5,200	189	310	93	5	3	1	4	0.8	1	1	2	0.4
Belfast	44,600	1,540	206	3,510	202	180	45	225	1.1	99	45	144	0.7
Cold	15,600	566	175	438	25	27	4	31	1.2	15	4	19	0.8
Rush	18,000	643	170	392	23	23	4	27	1.2	13	4	17	0.7
Wiscoy	16,000	578	160	1,060	61	70	13	83	1.4	39	13	52	0.9
Portage	30,900	1,060	207(7)	36,400	1,960	2,790	453	3,240	1.7	1,540	453	1,990	1.02
Tuscarora	9,300	343	165	495	29	32	4	36	1.2	18	4	22	0.8
Poag's Hole	32,100	1,120	150	1,120	65	79	12	91	1.4	44	12	56	0.9
Honeoye	9,000	331	294	147	8	5	2	7	0.9	3	2	5	0.6
Oatka	16,300	588	191	516	30	27	10	37	1.2	15	10	25	0.8

(1) First cost at July 1965 price levels, plus overhead and interest during construction.

(2) Includes interest and amortization over 100 years at 3-1/8 percent, operation, maintenance and replacements.

(3) Includes interest and amortization over 100 years at 3-1/8 percent (with replacement of power facilities in 50 years), plus 1.8 percent of investment for annual cost of operation, maintenance, interim replacements and administration.)

(4) Based on preliminary values by Federal Power Commission assuming private financing of steam plant as alternative to Portage development.

(5) Based on preliminary values by Federal Power Commission assuming Federal financing of steam plant as alternative to Portage development.

(6) Annual costs of alternative based on Federal financing divided by annual specific power costs.

(7) Because of extensive tunnels at Portage, determination of costs was not based on generalized curves used for other sites.

b. Regulation. Releases from upstream sites could augment the flows available for power generation at Portage, Belfast and Angelica with consequent increases in annual power benefits. However, comparability ratios would be changed only through cost reductions resulting from the use of larger units and the magnitude of change would be insufficient for justification at the two low-head sites. Reference to table L-6 will show that annual power benefits at Portage, net of specific costs, would be $1,280,000 for a firm regulated flow of 510 cfs or about $2,500 per cfs. Assuming that unit costs would not change significantly with increased flow, this figure would approximate the power value of flow augmentation at the Portage site. Firm yield from each inventory site, as determined for the two allocations of storage used to establish capabilities, was divided into annual charges to obtain a figure representing unit cost for water or, more correctly stated, representing a comparative index of unit cost. The costs for the five sites providing the most economical yields are shown in table L-7.

TABLE L-7. Comparative costs for water (1)

Site	Annual charges(2) ($1,000)	Storage for regulation: Live storage (A-ft)	Storage for regulation: Firm yield (cfs)	Storage for regulation: Annual water cost ($/cfs)	Storage for generation: Live storage (A-ft)	Storage for generation: Firm yield (cfs)	Storage for generation: Annual water cost ($/cfs)
Stannard	706	91,000	164	4,300	61,000	125	5,600
Belfast	1,540	126,000	292	5,300	117,000	245	6,300
Wiscoy	578	42,700	86	6,700	32,400	62	9,300
Angelica	597	43,700	49	12,200	36,000	44	13,600
Summit	189	19,000	14	13,500	9,000	9	21,000

(1) Based on net at-site yields.
(2) Total charges for dam and reservoir.

The storage allocation for power generation limited drawdown to 40 percent of maximum head. The same allocation of storage without power generation would allow more flexible operation and an increased potential for multiple-purpose use of reservoirs. Although costs and benefits for project purposes other than power are beyond the

scope of this appendix, preliminary estimates of potential benefits from certain other uses were considered and indicated that costs of water from multiple-purpose reservoirs would maintain approximately the same relationships among sites as shown in table L-7.

12. CONCLUSIONS

The Portage site, with the greatest volume of undeveloped storage and the most economical storage in the basin, would also provide the highest head for power generation and would have the greatest potential for multiple-purpose development. The existing Mt. Morris Dam, located about 20 river miles below the Portage site, provides flood control for the lower Genesee River valley but could also be modified in operation to provide other beneficial uses which might include hydroelectric power. If constructed, Portage reservoir could provide the replacement flood control storage necessary to allow changed use of Mt. Morris reservoir. Power plans utilizing pumped storage and involving the two pools would be possible. In any event, operations of the reservoirs would necessarily be closely coordinated. Therefore, the two reservoirs would be key elements in any basin plan to include power generation. Additional sites upstream could provide regulation storage to increase dependable yields available at generating sites, but the upstream projects would have to be developed primarily for purposes other than power. It was concluded that further studies of plans including only the two key projects would be sufficient to identify their best usage for power and to establish a basis for feasibility studies of power generation in a multiple-purpose basin plan for the Genesee River.

13. PORTAGE SITE

a. Site description. Portage Dam would be located at river mile 86.5, within and near the southern boundary of Letchworth Park and about one-half mile upstream from the beginning of the deep gorge section of the river. The dam would be a concrete gravity structure 110 feet high with a gated overflow spillway and gated outlet works. At the site, stream bottom is at elevation 1,085 feet. In the next five river miles downstream, the river follows a serpentine course and passes over rapids and a series of three falls to reach an elevation of 690 feet. At this point, the stream occupies a narrow gorge over 500 feet in depth and within the upstream limit of the Mt. Morris reservoir flood control pool. Straight-line distance from Portage reservoir to the point described would be about 9,000 feet.

b. Reservoir. The reservoir formed by the dam would be about 10 miles long occupying a relatively broad valley and providing a surface area of 6,500 acres. Construction of Portage Dam, and changed use of Mt. Morris Dam to provide a conservation pool as discussed in paragraph 15c. would result in a two-reservoir complex with geographical relationships shown on plate L-4. Creation of this system would be essential to any significant power development for either site. The river profile through the respective reaches is included with the general profiles of plate L-2. A detailed plan of features in the Portage site vicinity is shown on plate L-5.

c. Pool elevations and storage. To assess full potential for power, Portage site was assumed to be developed to the maximum scale considered in site screening studies, that is, with top of spillway gates at elevation 1,190 feet. Total storage volume would be 283,000 acre-feet. Conservation pools at elevations of 620 feet or 697 feet were assumed for Mt. Morris reservoir in power plans considered. These pools would entail a loss of flood control storage of 19,000 acre-feet and 159,000 acre-feet, respectively. Equivalent replacement storage for flood control would be required in Portage reservoir and maximum power pool elevations of 1,187 feet and 1,160 feet would result. Storage allocations and pool levels are summarized in table L-8.

TABLE L-8. Storage allocations - Portage

Mt. Morris conservation pool	El. 620	El. 697
Top of flood control pool elev. - feet	1,190	1,190
Maximum power pool elev. - feet	1,187	1,160
Minimum power pool elev. - feet	1,131	1,131
Active storage: Flood control-acre-ft.	19,000	159,000
Regulation - acre-ft.	232,000	92,000
Inactive storage - acre-ft.	32,000	32,000

With Mt. Morris at elevation 620, tailwater control for Portage power would be provided by a weir across the river near the upper limits of Mt. Morris reservoir. The weir was assumed to provide tailwater at the same elevation as the higher Mt. Morris conservation pool, that is, at 697 feet. Maximum gross head for power would then be 490 feet and 463 feet for the lower and higher levels, respectively, of Mt. Morris conservation pools.

d. Limits on diversion for power. Previous studies of the Portage falls in Letchworth Park have indicated that about 225 cfs is the minimum desirable flow from esthetic considerations. This figure was assumed to be required during daylight hours in the months of May through October. The equivalent mean monthly flow would be about 170 cfs. Regulated flows in excess of this figure and adjusted for estimated losses, were assumed to be available for the power diversion at Portage. In computations for plans considered in this appendix, this monthly mean flow was assumed to be required throughout the year to partially meet expected low flow requirements below Mt. Morris.

14. POWER FEATURES - PORTAGE

a. Facilities. At the Portage site, a diversion tunnel from an intake in the pool area and a tailrace tunnel discharging into the river gorge below the falls would be necessary to develop the head available for power. Sheer cliffs in the vicinity of the discharge portal would require that the powerhouse be an underground structure. A vertical access shaft would be provided for equipment and personnel. The pressure tunnel would be about 3,500 feet long

and the tailrace tunnel about 5,000 feet in length. Tunnels were assumed concrete-lined throughout. Surge chambers would be provided on the pressure tunnel for plans utilizing conventional units and on the tailrace tunnel for plans with either conventional or reversible pump-turbine units. Substation would be a conventional installation on the surface with low voltage lines from the generators occupying a chamber provided in the access shaft. The tunnel alinement for which cost estimates were made would have the powerhouse on the east side of the river and would require that major features be located within Letchworth State Park. Locations of features at the Portage site would be essentially the same for each of the three plans investigated and are shown on plate L-5.

b. Alternative alinements. An alinement with the powerhouse located to the west of the river was also considered. It would be more costly, primarily because of increased tunnel costs, but would require that only the tailrace tunnel be within Letchworth Park limits. An extended tailrace to a downstream point in the river was also considered for the alinement with powerhouse to the east of the river. However, the value of the increased head available was found to be less than additional costs for the tunnel.

c. Plan A - conventional. This plan would provide 50,000 kilowatts of conventional peaking capacity at Portage site designed for a load factor of 10 percent during the critical period. Average annual plant factor would be about 35 percent providing energy of 154,000 megawatt hours. Mt. Morris pool would be maintained at elevation 697 during the recreation season, except for flood control operation, to minimize pool fluctuations from regulation of Portage releases and to allow possible power generation at Mt. Morris Dam. The Mt. Morris pool could be drawn down to elevation 665 feet after 1 November each year if not required for Portage tailwater control.

d. Plan B - conventional. The plan would provide 150,000 kilowatts of dependable capacity in a conventional peaking plant at Portage site designed to operate at a load factor of 10 percent in the critical period. Average annual energy production would be 211,000 megawatt hours and the average annual plant factor about 16 percent. Mt. Morris pool would be maintained between elevation 618 feet and 620 feet, exclusive of flood control operations, and would experience daily fluctuations of about 2 feet for regulation of Portage power releases.

e. Plan C - pumped storage, integral. Reversible units would be provided at Portage in this plan to allow pumping in off-peak hours from the Mt. Morris reservoir, maintained at elevation 697 feet for lower

pool, to the Portage reservoir serving as upper pool. Capacity would be 200,000 kilowatts and average annual energy would be 370,000 megawatt hours. Pumping energy requirements to assure 6 hours per day generation for 5 days per week throughout the year would be 146,000 megawatt hours. Table L-9 summarizes plan capabilities for the Portage installation.

TABLE L-9. Portage capability

Item	Plan A	Plan B	Plan C
Type of development	Convent.	Convent.	Pumped
Capacity - kw	50,000	150,000	200,000
Nominal load factor - %	10	10	18(1)
Avg. ann. plant factor - %	35	16	21(2)
Avg. ann. energy - mwh	154,000	211,000	370,000
Avg. ann. pump. energy - mwh	-	-	146,000
Max. normal operating pool elev.			
Portage - ft.	1,160	1,187	1,160
Mt. Morris - ft.	697	620	697

(1) 6 hours/day, 5 days/week.
(2) 1,825 hours/year.

Detailed data and analyses of plans described are given in appropriate sections below.

15. MT. MORRIS DAM AND RESERVOIR

a. Description. Mt. Morris Dam is a concrete gravity structure constructed by the Corps of Engineers and located at Genesee River mile 66.9 measured from the river mouth at Lake Ontario. Overflow spillway is uncontrolled and designed for a surcharge of 28 feet. Outlet works consist of 9 gated conduits 5 feet by 7 feet each. At spillway crest elevation, the reservoir extends upstream to mile 83.6, contains

337,400 acre-feet and covers 3,300 acres, and is confined in the narrow, steepsided river gorge between the dam and the lower Portage Falls. The entire reservoir area is within the limits of Letchworth State Park.

b. Reservoir operation. Since the beginning of operations in November 1951, the Corps has used the dam for single-purpose flood control regulation in accordance with the project authorization. Under an agreement with the Genesee State Park Commission, a small headwater pool is maintained at elevation 598 feet from 15 June to 1 November each year for scenic beauty in Letchworth Park. After 1 November, the pool is drawn down to elevation 586 feet and all natural inflows within the non-damaging range are released. Despite other requirements, natural inflows of 300 cfs and less must be released for operation of the Mt. Morris hydroelectric power plant owned by Rochester Gas and Electric Corporation and located about 1.3 miles downstream from the Federal dam.

c. Possible changes in operation. A basin plan to include power generation or regulation storage only at sites upstream from Mt. Morris would allow the reservoir to be used essentially as it is under present conditions with consideration for downstream flow commitments. Any alternative plan to include generation of power at Mt. Morris Dam would require:

(1) A permanent pool within limiting elevations imposed by existing penstock recesses;

(2) Replacement flood control storage elsewhere in the basin equivalent to that taken for the permanent pool in Mt. Morris reservoir;

(3) Minimum fluctuations of pool levels during the recreation season, except for the regulation of flood flows, consistent with present operating agreements; and

(4) Release of natural flows up to 300 cfs, or amendment of agreements governing releases for downstream power.

An increased permanent pool elevation could also be considered for a plan such as Plan B, not involving power generation at Mt. Morris Dam. Requirements (2) through (4) above would apply but pool levels would be independent of Mt. Morris penstock intake elevations. Rather, maximum and minimum pool levels would be related to scenic values and additional water-oriented recreation opportunities in Letchworth Park. Preliminary evaluation of the recreational potential indicates that a pool elevation of at least 680 feet would be desirable rather than the elevation of 620 feet assumed for Plan B. Tailwater at Mt. Morris Dam is not

seriously affected by the existing hydroelectric plant at Mt. Morris and the latter could modify operations to be compatible with changed use of the Federal dam. Further consideration of this factor was deferred for inclusion in multiple-purpose basin plan studies when actual release schedules for Mt. Morris can be determined.

d. Storage allocations. Controlling water surface elevations and allocations of storage for present and considered future operation procedures for Mt. Morris Dam are shown in table L-10.

TABLE L-10. Storage allocations - Mt. Morris

Description	Present operation	Considered future operation: With power	Considered future operation: Without power
Max. pool elev. - ft.	788	788	788
Spillway crest elev. - ft.	760	760	760
Max. normal operating elev.-ft.(1)	598(2)	697(3)	680
Min. normal operating elev.-ft.	586(4)	665(5)	586(5)
Active storage:			
Flood control - acre - ft.(6)	336,600	178,300	217,600
Other - acre - ft.	-	71,000	119,000(5)
Inactive storage - acre - ft.	800	88,100	800
Total storage - acre - ft.(5)	337,400	337,400	337,400

(1) Exclusive of flood control operation.
(2) 15 June to 1 November each year.
(3) A plan with Mt. Morris pool at elevation 620 was also investigated.
(4) 1 November to 1 June each year.
(5) Drawdown to begin after 1 November.
(6) At spillway crest elevation.

16. POWER FEATURES - MT. MORRIS

a. Existing penstock recesses. Two recesses for future installation of penstocks were provided in Mt. Morris Dam during construction and were capped with concrete plugs. Openings are each 19 feet - 9 inches inside diameter with centerline at elevation 644.5 feet. Minimum pool for power at the site would be about elevation 665 feet. Maximum power pool at elevation 697 feet was assumed in design of the dam. With tailwater between elevations 575 feet and 585 feet for normal flow conditions, gross head for power at Mt. Morris Dam could vary between 80 feet and 122 feet.

b. Conventional power. Power development at Mt. Morris Dam would be conventional peaking power with available flows dependent on upstream releases during the recreation season when drawdown of the reservoir would be severely limited. Drawdown of the reservoir could be considered during the remainder of the year in any plans of development not required to provide tailwater control at the Portage site. Because of the low head available, development of power at Mt. Morris Dam was considered only as an adjunct to plans of development based on the power potential of the Portage site. A conventional powerhouse would be constructed below the dam at the penstock recesses provided in the left abutment. Minimum mean monthly release to the lower river was assumed equivalent to the Portage release for the river falls. Load factor would be determined by release schedules from the Portage reservoir and the additional regulation which could be provided by Mt. Morris reservoir within a limit of about two feet of daily pool fluctuations, except for flood control operation periods. Capabilities are summarized in table L-11. Plans are those defined for Portage site.

TABLE L-11. Mt. Morris Dam capability

Item	Plan A	Plan B	Plan C
Type of development	Convent.	None	Convent.
Capacity - kw	20,000	-	3,700
Average annual plant factor - %	40	-	60
Average annual energy - mwh	69,000	-	19,500
Normal operating pool elev.:			
Maximum - ft.	697	620	697
Minimum - ft.	695	618	695

c. Plan D - pumped storage, adjoining. The plan would require the use of Mt. Morris reservoir as lower pool, and a small adjoining reservoir to serve as upper pool would be constructed atop the left bank of the river near the upstream limit of Mt. Morris reservoir. Powerhouse would be an underground facility as in the plans considered for Portage site. Portage reservoir would be required for replacement of flood storage lost in providing a permanent Mt. Morris pool. Capacity would be 310,000 kilowatts and operation for 6 hours per day and 5 days per week throughout the year would provide 484,000 megawatt hours of energy annually. All flows would require to be pumped and annual pumping energy required would be about 725,000 megawatt hours. Locations of features for Plan D are shown on plate L-5. Availability of an area with suitable terrain and lying outside Letchworth Park, proximity to the river, and head available were factors in locating plan features. Details and project data are given in relevant paragraphs below.

17. PLANT OPERATION, CAPACITY AND ENERGY

Power plans were developed without consideration for other possible project purposes except for requirements that could be identified as common to any multiple-purpose plans that might conceivably be investigated. Such requirements would include a minimum flow for the falls in Letchworth Park, a minimum flow from Mt. Morris reservoir, and a limit of about two feet on Mt. Morris daily pool fluctuations from power operations. Preliminary studies which included additional increments of storage in impoundments upstream of Portage site showed that construction of such impoundments for the single purpose of power production could not be justified. Plans investigated further were then limited to use of the Mt. Morris - Portage system. The studies also showed that plans for conventional generation should provide development of the maximum firm capacity possible with the available regulation storage. Provision of interruptible capacity was not evaluated. Upper limits for developments including pumped storage would be determined by permissible variations in the elevation of Mt. Morris pool and by the estimated effects of power releases on the upper reaches of the pool.

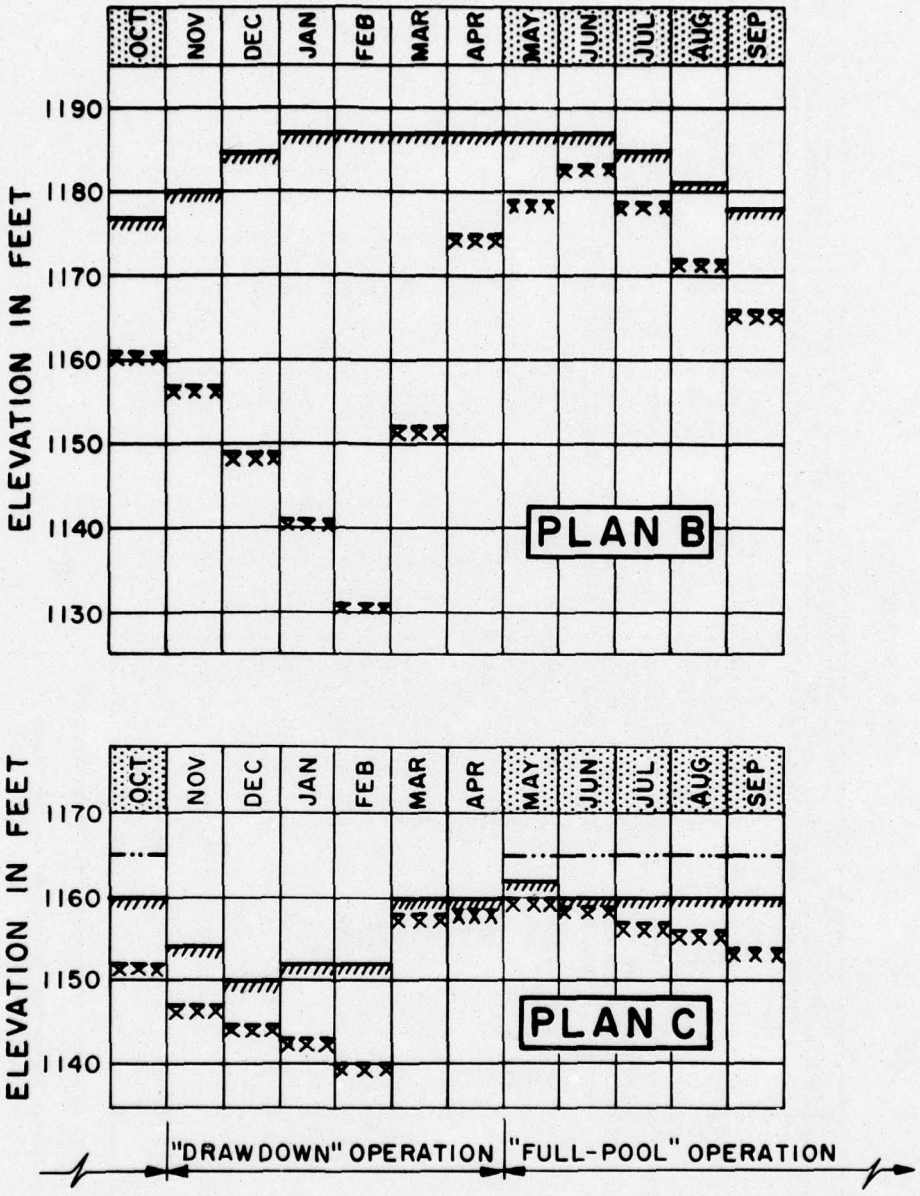
a. Water available for conventional power. Storage-yield relations developed for inventory studies were also used to estimate gross water yields available for the more detailed power studies of Plan A and Plan B, defined in paragraph 14. Evaporation loss for the critical period was estimated at 4.5 cfs per 1,000 acres of water surface. From the two-reservoir system, losses would be 20 cfs and 15 cfs for Plan A and Plan B, respectively. Allowance for other losses at about 2 percent of minimum regulated flows resulted in adoption of a total estimated loss rate of 26 cfs for each of the two plans. Losses were assumed to be constant at this rate over the period of record. Required releases for the falls in Letchworth Park were assumed at 170 cfs, mean monthly, as discussed in paragraph 13d. This rate was assumed necessary throughout the year in consideration of probable requirements for the river below Mt. Morris. Peaking operation at 10 percent load factor during the critical period was considered appropriate for conventional generation.

b. Capacity and energy, conventional plans. Routings of mean monthly discharges were made for a range of firm power releases to determine average annual load factors. Generation was assumed to be continuous, up to turbine capacity, during periods when maximum regulation pool level would otherwise be exceeded. When maximum regulation pool levels could be maintained by releases less than turbine

capacity, but greater than the minimum required for generation 10 percent of the time, energy was considered to be produced for the duration of time possible with the available water. When pool levels would be less than maximum regulation pool during a given month, a 10 percent load factor was assumed. End of month pool levels of Portage reservoir for Plan B, for the critical year and for an estimated average year, are shown on figure 1. Trial routings of daily flows for selected periods were also made to obtain estimates of reservoir spillage that would not be disclosed in routings of monthly discharges. The corrected load factors were used for estimating average annual energy generated in plans investigated. Overall plant efficiency was assumed at 85 percent for capacity computations. Dependable capacity was also used for installed capacity. Critical periods were checked to verify that power discharges required at minimum normal operating heads would be available but no adjustment of efficiency was made for low head operation in these periods. Data for conventional plans A and B, developed for maximum water yields from regulation storages available under adopted controlling pool levels, are included in table L-12.

c. Integral pumped storage plan. A plan of the integral type of pumped storage, Plan C as previously defined, would be similar to conventional Plan A but would include reversible pump-turbine units to provide greater dependable capacity by pumping in off-peak hours during low flow periods. Generation for a minimum of 6 hours per day, 5 days per week throughout the year was adopted as the criterion for a plan of this type. Evaporation and other losses were estimated at a rate of 30 cfs. Releases for the falls and lower river were assumed at 170 cfs, mean monthly, as in other plans. Energy for pumping in periods of deficient flow was estimated at one and one-half times the energy that would be generated by the water pumped. Two methods of operation were assumed. "Full pool" operation, used during the months significant for recreational use, May through October, would permit drawdown below maximum power pool only to provide the minimum release for the falls. Five feet of flood control storage was assumed to be available for short-term regulation of excess flow during this period. In the remainder of the year, "drawdown" operation would permit use of pool storage to supplement natural inflows. Minimum levels for each month were predetermined to insure that storage for minimum releases plus losses would be available in critical periods. The limit of two feet for Mt. Morris daily pool fluctuations would allow 4,800 acre-feet of storage to be used at pool levels assumed. In a six hour period, power discharge could then be about 9,600 cfs. However, the Mt. Morris pool in the area of the tailrace discharge portal would have limited cross-sectional area and average velocities downstream from the portal would be 8 to 13 feet per second

ESTIMATED END OF MONTH POOL ELEVATIONS
PORTAGE RESERVOIR



LEGEND:

- SHORT TERM REGULATION POOL
- CRITICAL YEAR
- AVERAGE YEAR
- SIGNIFICANT RECREATION MONTHS

FIGURE 1

TABLE L-12. Plan data

Item	Unit	Plan A		Plan B		Plan C		Plan D		
		Portage	Mt. Morris	Portage	Mt. Morris	Portage	Mt. Morris	Portage	Adjoin. Res:	Mt. Morris
Type of developement	-	Conventional	Conventional	Conventional	-	Pumped stor.	Conventional	-	Pumped stor.	Conventional
Spillway design flood elev.	ft	1,195	788	1,195	788	1,195	788	1,195	-	788
Max. flood control pool elev.	ft	1,190	760	1,190	760	1,190	760	1,190	-	760
Max. power pool elev.	ft	1,160	697	1,187	620(a)	1,160	697	1,160(a)	1,381	697
Min. power pool elev.	ft	1,131	695	1,131	618(a)	1,140	695	1,155(a)	1,370	695
Active storage: Flood control	acre-ft	159,000	177,600	19,000	317,600	159,000	177,600	159,000	-	177,600
Regulation	acre-ft	92,000	4,800	232,000	1,800	70,000	4,800	22,000	3,600	4,800
Inactive storage	acre-ft	32,000	155,000	32,000	18,000	54,000	155,000	102,000	1,500	155,000
Total storage capacity	acre-ft	283,000	337,400	283,000	337,400	283,000	337,400	283,000	5,100	337,400
Min. regulated discharge	cfs	356	358	650	652	200	172	200	-	172
Release for Letchwortn falls	cfs	170	-	170	-	170	-	170	-	-
Losses	cfs	26	(b)	26	(b)	30	(b)	30	(b)	(b)
Flow available for power	cfs	160	242	454	-	-	92	-	-	92
Power discharge (at avg. net head)	cfs	1,600	2,420	4,500	-	6,500	460	-	6,650	460
Max. gross head	ft	463	122	490	-	463	122	-	685	122
Min. gross head	ft	434	110	434	-	443	110	-	673	110
Avg. gross head	ft	459	116	483	-	460	116	-	681	116
Avg. net head	ft	439	114	463	-	427	114	-	646	114
Avg. tailwater elev.	ft	697	580	697	-	697	580	-	697	580
Pressure tunnel diameter (I.D.)	ft	12	-	18	-	18	-	-	18	-
Tailrace tunnel diameter (I.D.)	ft	16	-	24	-	25	-	-	25	-
Nominal load factor	o/o	10	10	10	-	18	20	-	18	20
Average annual load factor	o/o	35	40	16	-	21	60	-	18	60
Installed (dependable) capacity	kw	50,000	20,000	150,000	-	200,000	3,700	-	310,000	3,700
Number of units		1	1	1		2	1		2	1
Avg. ann. energy generated	mwh	154,000	69,000	211,000	-	370,000	19,500	-	484,000	19,500
Avg. ann. energy for pumping	mwh	-	-	-	-	146,000	-	-	725,000	-

NOTES: (a) Pool used for regulation, power not considered for site in this plan.

(b) Losses for entire reservoir system are included in Portage figure.

depending upon pool level. Plan C, as presented herein, would have power discharges of about 6,500 cfs and velocities below the discharge portal would be 5 to 7 feet per second. Plant capacity was computed using an overall efficiency of 85 percent. Critical year and estimated average year monthly levels for Portage reservoir with Plan C operated as described are shown in figure 1. Plan data are included on table L-12.

d. Adjoining pumped storage plan. A small reservoir adjoining the upper reach of Mt. Morris reservoir would be provided for Plan D, defined in paragraph 16c. Losses from reservoirs and releases from Portage pool for the Letchworth Park falls and the lower river were assumed at 30 cfs and 170 cfs, respectively, as for Plan C. Operation was assumed for 6 hours per day, 5 days per week and, since all water for power generation would have to be pumped to the adjoining reservoir, nominal and average annual load factors would be the same. Portage pool was assumed drawn down during the critical period only to the extent necessary for losses and downstream flow requirements. Energy for pumping was estimated as for Plan C and limits on maximum feasible capacity were also determined by the criteria outlined for that plan. Plan data are shown in table L-12.

e. Mt. Morris power. Except for Plan B, operation of plans described would provide regulated flow which could be developed for power at the existing Mt. Morris Dam. Losses for Mt. Morris reservoir were included in the two-reservoir system losses cited for each plan. A minimum continuous release of 100 cfs to the lower river was assumed and the remainder of regulated minimum releases would be available to generate peaking power in a conventional plant at the dam. Storage available within the prescribed range for Mt. Morris reservoir would be adequate for re-regulation by that pool. Load factor for Plan A would be 10 percent during the critical period. The factor would be 20 percent for plans C and D to accommodate the larger power releases in those plans. Data for Mt. Morris Dam development are given in table L-12.

18. WATERWAY FACILITIES

a. Intakes and tunnels. Each of the three plans requiring an intake in the Portage pool would have facilities alined approximately as shown on plate L-5. Intakes would include a conduit section, a structure housing trash racks and an emergency bulkhead closure, and a transition to the tunnel section. Intake for the upper reservoir in Plan D would be similar except that an intake channel would replace the conduit section. No detailed subsurface information is available along the alinements proposed for tunnels but it is likely that formations encountered would be primarily shales with interbedded sandstones and

flags as discussed in subsequent sub-paragraphs e and f. Consequently, concrete lining was assumed necessary for all subterranean structures. Tunnel sizes, based on preliminary comparisons of the power values for head loss and costs of tunnels, were selected as follows:

	Plan A	Plan B	Plan C	Plan D
Design discharge (cfs)	1,600	4,500	6,500	6,650
Pressure tunnel diam. (ft.)	12	18	18	18
Velocity (fps)	14.2	17.7	25.6	26.2
Tailrace tunnel diam. (ft.)	16	24	25	25
Velocity (fps)	8.0	10.0	13.2	13.5

Tailrace tunnel portal would require a trash rack for pumped storage plans. An excavated transition channel to meet natural river bottom would be required at the portal in all plans.

b. Surge chambers. Chambers would be provided on the pressure tunnels in each of conventional plans A and B. The chambers would be vertical cylindrical structures excavated in rock with differential risers from the tunnels and would be concrete lined. Tailrace tunnels would also require surge chambers in each of plans A, B, and C. Tailrace chambers would consist of either vertical structures or enlarged tailrace sections depending upon requirements revealed when detailed design studies are made.

c. Upper reservoir, Plan D. An area with suitable terrain and located as shown on plate L-5 would provide about 200 acres for the construction of an upper reservoir. Earth embankments would be required and the reservoir area would be graded, compacted, and treated for control of seepage.

d. Tailwater control weir, Plan B. Mt. Morris pool would not reach the tailrace discharge portal in Plan B. An overflow weir across the river would be provided downstream from the portal for tailwater control and for alleviation of turbulence from power flows. Design studies were not made but a structure rising about six feet above river bottom and equipped with sluice-gated culverts for emptying was considered adequate for the purpose to be served.

e. Geologic conditions in vicinity of power tunnels, Plans A, B, and C. A review of the literature and brief field reconnaissance indicates that the intake structure as shown on plates L-5 and L-6 may or may not be in Nunda Sandstone, the tunnel, access shaft, and powerhouse largely in Gardeau Shale, and the surge chamber and tailrace in Gardeau Shale - Grimes Sandstone sequence. However, there is a buried, filled pre-glacial valley east of Portageville. The exact location is not known but borings drilled about 1908 by the State Water Supply Commission in the general vicinity of the proposed power tunnel alinement and in 1952 by the Corps of Engineers about 300 feet east of the proposed tunnel alinement were drilled to maximum depths of 150 feet, elevation 1804, and 236.5 feet, elevation 1044.7, respectively without penetrating bedrock. Therefore, it appears that a portion of the proposed tunnel and possibly the intake structure may lie in the buried valley. Additional explorations are required to define the location of the buried channel, the nature of the filling material, and the geologic units present at the proposed structures. It appears that during advance engineering studies and based upon subsurface explorations the intake structure and tunnels could be located in sound bedrock.

f. Geologic conditions in the vicinity of power tunnel, Plan D. The power tunnel and access shaft should be largely in the Nunda Sandstone - Gardeau Shale sequence and the powerhouse and tailrace probably in the Gardeau Shale - Grimes Sandstone sequence. The Nunda Sandstone is exposed at the proposed Portage damsite and is a hard, massive, fine-grained, moderately jointed, shaly sandstone with some thinly bedded, moderately hard, calcareous shales. The Gardeau Shale underlies the Nunda and is exposed along the gorge walls along the Genesee River and is slightly soft to moderately hard, dark gray, black and light gray shales interbedded with thin sandstones. The Grimes Sandstone underlies the Gardeau and is a sandy shale separated by several thin sandstone beds.

19. POWERPLANT

The powerhouse at Portage for Plans A, B, and C, near the upper reach of Mt. Morris pool for Plan D, would be an underground structure excavated in rock, as shown on plates L-6 and L-7. A vertical cylindrical access shaft would be provided with separate compartments for equipment, generator leads, and a personnel elevator. An access building with hoisting equipment would be located atop the shaft. Francis turbines would be used for conventional units and Francis-type pump-turbine units would be used for plans to include pumping. Penstocks for conventional plans would be equipped with butterfly valves. Spherical valves would be used on penstocks to pump-turbines. Step-up substations were assumed to be located on the surface although underground

transformer vaults adjacent to the powerhouse will be considered if further design studies are undertaken. Detailed studies of units or equipment were not made, but data from manufacturers were used as guides in determining number of units and required dimensions for access shafts and powerhouses for station capacities selected for study. Relevant data would be as follows:

	Plan A	Plan B	Plan C	Plan D
Plant capacity (mw)	50	150	200	310
No. of units	1	1	2	2
Access shaft diam (ft.)	27	35	35	40

ECONOMIC ANALYSIS

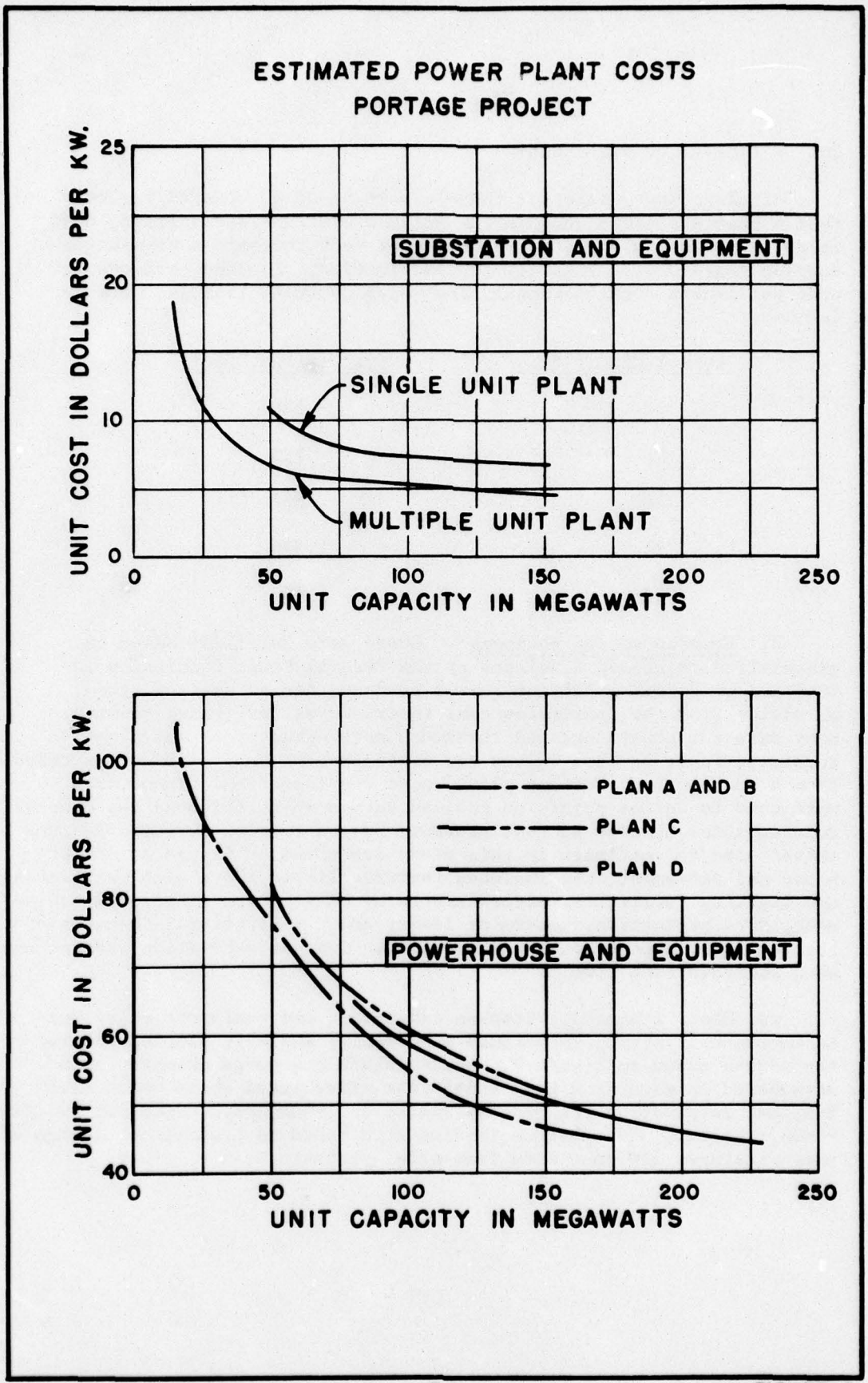
20. ESTIMATES OF FIRST COST

a. Tunnels. Costs for tunnels were based on updated figures from a previous study made in the Buffalo District and defining cost ranges for tunnels of different sizes in rock formations presenting varying degrees of difficulty in construction. Adopted estimates of cost per linear foot of tunnel, including concrete linings, were as follows:

Tunnel diam. (ft.)	Cost ($/lin. ft.)
12	520
16	725
18	860
24	1,370
25	1,460

b. Powerhouse and equipment. Costs were initially based on generalized relations developed by the Federal Power Commission in 1964 and on Buffalo District curves prepared for an earlier study. On advice from the Commission that their curves were being revised, cost data for generators and turbines, motor-generators and pump-turbines, water control valves and miscellaneous equipment were secured from a manufacturer for two plans under consideration. These data were used to define points on revised curves which followed the general relationships of size to cost provided by the initial curves. Revised curves used for estimate in this study are shown on figure 2. Powerhouse and equipment item includes features listed above plus ventilating and lighting facilities, miscellaneous mechanical and electrical equipment, fire protection, generator leads, and all structural features of the underground powerhouse installation. Cost of excavation was included as a separate line item.

c. Other features. Step-up substation and equipment costs were estimated for various increments of capacity and were plotted to give the curves shown on figure 2. Access shaft and surge chamber costs were based on data from the tunnel cost study cited above which also included information relevant to shafts and chambers. Costs for buildings, roads, intakes, and other facilities were based on preliminary design of these features and cost data from other projects.


ESTIMATED POWER PLANT COSTS
PORTAGE PROJECT
UNIT COST IN DOLLARS PER KW.
25
20
10
0
SUBSTATION AND EQUIPMENT
SINGLE UNIT PLANT
MULTIPLE UNIT PLANT
0
50
100
150
200
250
UNIT CAPACITY IN MEGAWATTS
UNIT COST IN DOLLARS PER KW.
100
80
60
40
PLAN A AND B
PLAN C
PLAN D
POWERHOUSE AND EQUIPMENT
0
50
100
150
200
250
UNIT CAPACITY IN MEGAWATTS

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FIGURE 2

d. Mt. Morris plant. Cost estimates for the plant at Mt. Morris Dam were developed in less detail than for the larger upstream facilities. In addition to powerhouse and equipment, and substation, a line item for site preparation was included to cover costs for excavation below the penstock recesses and for necessary alterations to the existing dam and stilling basin structure.

e. Summary of first costs. First cost for specific facilities, including contingencies, engineering and design, supervision and administration for each plant considered is summarized in table L-13. Interest during construction and investment cost is also shown. A construction period of four years was assumed for the Portage site and for the adjoining pumped storage development for Mt. Morris reservoir. A two year period was used for the Mt. Morris Dam plant. Interest rate used was 3-1/8 percent. Complete summaries of estimated cost are presented in table L-14, L-15 and L-16.

TABLE L-13. Summary of first costs, specific power facilities

Description	Capacity (mw)	First cost ($1,000)	Interest during const. ($1,000)	Investment ($1,000)	Investment ($/kw)
Plan A-Portage	50	22,750	1,450	24,200	484
Mt. Morris (1)	20	7,260	230	7,490	374
Plan B-Portage	150	41,100	2,600	43,700	291
Plan C-Portage	200	44,500	2,800	47,300	236
Mt. Morris (1)	3.7	3,320	100	3,420	924
Plan D-Mt. Morris(2)	310	43,380	2,720	46,100	149
Mt. Morris(1)	3.7	3,320	100	3,420	924

(1) At existing dam.
(2) Pumped storage, adjoining reservoir.

Table L-14. Cost estimates, conventional plans

PLAN A: 50,000 kw

Description	Quant.	Unit	Unit price	Amount
			$	$
Power plant				
Access shaft (27 ft. I.D.)	380	LF	3,000.00	1,140,000
Access building	-	LS	-	340,000
Elevator	-	LS	-	200,000
Powerhouse and equipment	-	LS	-	3,825,000
Powerhouse excavation	21,600	CY	18.50	400,000
Substation and equipment	-	LS	-	550,000
Total power plant				6,455,000
Waterways				
Intake structure and appurtenances	-	LS	-	1,190,000
Intake access road	-	LS	-	115,000
Power tunnel (12 ft.I.D.)	3,500	LF	520.00	1,820,000
Surge chamber	-	LS	-	1,283,000
Tailrace tunnel (16 ft.I.D.)	5,000	LF	725.00	3,625,000
Tailrace surge chamber	-	LS	-	654,000
Total waterways				8,687,000
Total (less contingencies)				15,142,000
Contingencies (25%)				**3,786,000**
Estimated contractor's earnings plus contingencies				**18,928,000**
Engineering and design				**2,082,000**
Supervision & administration				**1,740,000**
TOTAL FIRST COST				**22,750,000**
Interest during construction (4 years @ 3-1/8%)				**1,450,000**
INVESTMENT				**24,200,000**

PLAN B: 150,000 kw

Description	Quant.	Unit	Unit price	Amount
			$	$
Power plant				
Access shaft (35 ft. I.D.)	370	LF	4,913.00	1,818,000
Access building	-	LS	-	384,000
Elevator	-	LS	-	200,000
Powerhouse and equipment	-	LS	-	6,975,000
Powerhouse excavation	52,350	CY	18.50	968,500
Substation and equipment	-	LS	-	1,020,000
Total power plant				11,365,500
Waterways				
Intake structure and appurtenances	-	LS	-	1,683,500
Intake access road	-	LS	-	115,000
Power tunnel (18 ft.I.D.)	3,500	LF	860.00	3,010,000
Surge chamber	-	LS	-	3,400,000
Tailrace tunnel (24 ft. I.D.)	5,000	LF	1,370.00	6,850,000
Tailrace surge chamber	-	LS	-	990,000
Weir	-	LS	-	500,000
Total waterways				16,548,500
Total (less contingencies)				27,914,000
Contingencies (25%				**6,976,000**
Estimated contractor's earnings plus contingencies				**34,890,000**
Engineering and design				**3,489,000**
Supervision & administration				**2,721,000**
TOTAL FIRST COST				**41,100,000**
Interest during construction (4 years @ 3-1/8%)				**2,600,000**
INVESTMENT				**43,700,000**

Table L-15. Cost estimates, pumped-storage plans

PLAN C: 200,000 kw

Description	Quant.	Unit	Unit price	Amount
			$	$
Power plant				
Access shaft (35 ft. I.D.)	380	LF	4,913.00	1,867,000
Access building	-	LS	-	396,000
Elevator	-	LS	-	200,000
Powerhouse and equipment	-	LS	-	12,200,000
Powerhouse excavation	64,500	CY	18.50	1,193,000
Substation and equipment	-	LS	-	1,090,000
Total power plant				16,946,000
Waterways				
Intake structure and appurtenances	-	LS	-	1,746,000
Intake access road	-	LS	-	115,000
Power tunnel (18 ft. I.D.)	3,500	LF	860.00	3,010,000
Tailrace tunnel (25 ft. I.D.)	5,000	LF	1,460.00	7,300,000
Tailrace surge chamber	-	LS	-	1,090,000
Total waterways				13,371,000
Total (less contingencies)				30,317,000
Contingencies (25%)				7,583,000
Estimated contractor's earnings plus contingencies				37,900,000
Engineering and design				3,400,000
Supervision & administration				3,200,000
TOTAL FIRST COST				44,500,000
Interest during construction (4 years @ 3-1/8%)				2,800,000
INVESTMENT				47,300,000

PLAN D: 310,000 kw

Description	Quant.	Unit	Unit price	Amount
			$	$
Power plant				
Access shaft (40 ft. I.D.)	460	LF	6,215.00	2,859,000
Access building	-	LS	-	518,000
Elevator	-	LS	-	200,000
Powerhouse and equipment	-	LS	-	15,500,000
Powerhouse excavation	81,938	CY	18.50	1,516,000
Substation and equipment	-	LS	-	1,364,000
Total power plant				21,957,000
Waterways				
Intake structure and channel	-	LS	-	1,440,000
Intake access road	-	LS	-	33,800
Intake reservoir levee	475,000	CY	0.35	166,200
Intake reservoir site preparation	-	LS	-	500,000
Power tunnel (18 ft. I.D.)	4,000	LF	860.00	3,440,000
Tailrace tunnel (25 ft. I.D.)	1,350	LF	1,460.00	1,971,000
Total waterways				7,551,000
Total (less contingencies)				29,508,000
Contingencies (25%)				7,392,000
Estimated contractor's earnings plus contingencies				36,900,000
Engineering and design				3,510,000
Supervision & administration				2,940,000
Land costs, intake reservoir				30,000
TOTAL FIRST COST				43,380,000
Interest during construction (4 years @ 3-1/8%)				2,720,000
INVESTMENT				46,100,000

TABLE L-16. Cost estimates, Mt. Morris Dam power

PLAN A: 20,000 kw

Description	Unit	Amount
		$
Powerhouse and equipment	LS	3,180,000
Substation and equipment	LS	590,000
Site preparation	LS	960,000
Total (less contingencies)		4,730,000
Contingencies (25%)		1,183,000
Est. contractor's earnings plus contingencies		5,913,000
Engineering and design		763,000
Supervision and administration		584,000
TOTAL FIRST COST		7,260,000
Interest during construction (2 years @ 3-1/8%)		230,000
INVESTMENT		7,490,000

PLANS C and D: 3,700 kw

Description	Unit	Amount
		$
Powerhouse and equipment	LS	700,000
Substation and equipment	LS	480,000
Site preparation	LS	900,000
Total (less contingencies)		2,080,000
Contingencies (25%)		520,000
Estimated contractor's earnings plus contingencies		2,600,000
Engineering and design		434,000
Supervision and administration		286,000
TOTAL FIRST COST		3,320,000
Interest during construction (2 years @ 3-1/8%)		100,000
INVESTMENT		3,420,000

21. ANNUAL CHARGES

Annual charges on the investment in specific power facilities were estimated as follows:

Interest -- 3-1/8 percent Federal rate

Amortization -- 100-year life at 3-1/8 percent

Interim replacements -- 0.20 percent of investment

Major replacements -- 0.42 percent of investment in powerplant

Operation and maintenance -- curves of cost/kw

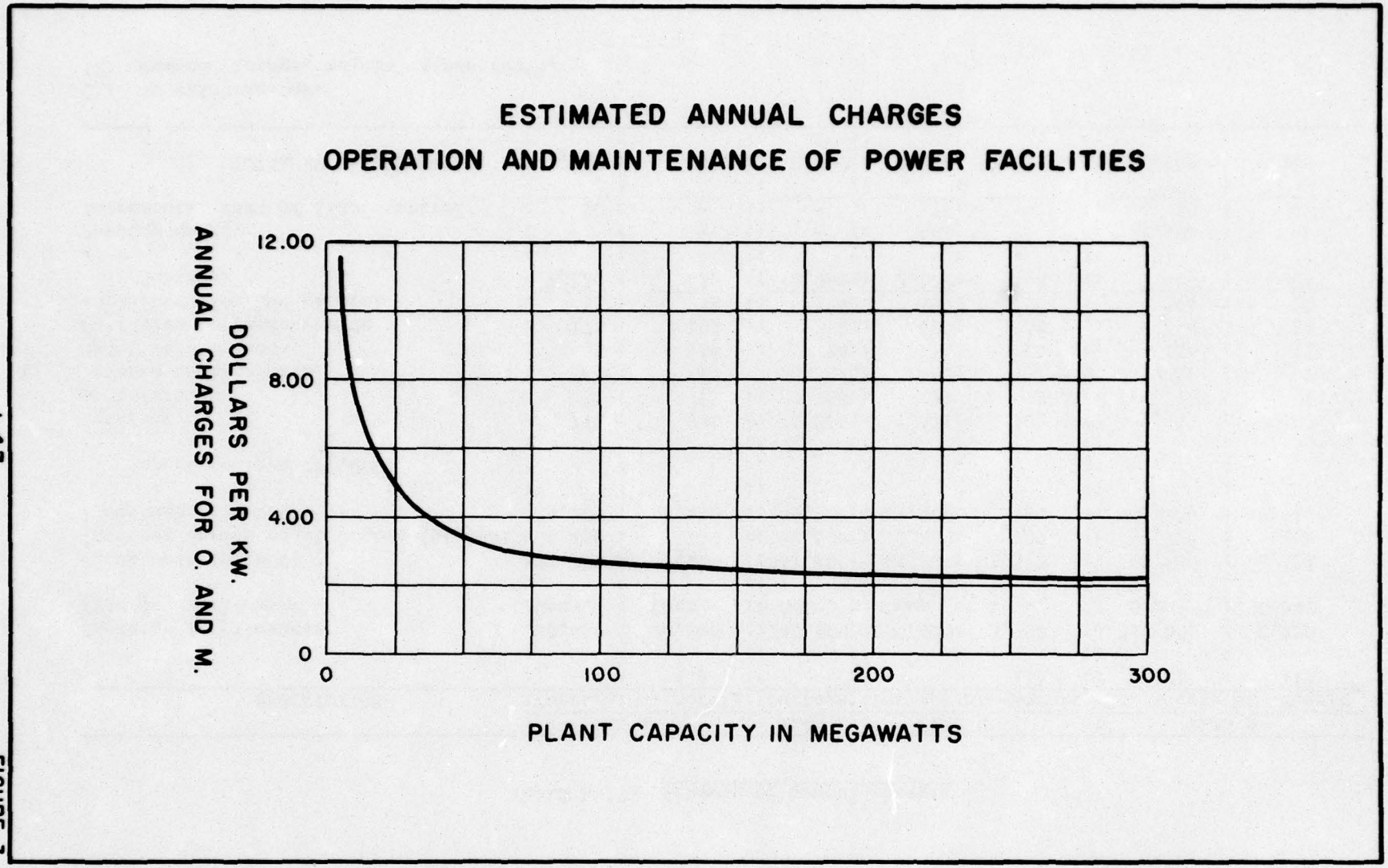
Administration and general -- 35 percent of annual operation and maintenance charges

Pumping energy -- 3.0 mills/kwh

a. Major replacement charges. This item was used to estimate annual charges for features requiring replacement after the first 50 years of the 100-year period of analysis. Investigation of two plans estimated in detail indicated that such features would total about 77.5 percent of the cost of powerhouse and equipment and about 75 percent of the cost of elevator, access building, substation and equipment. Investment on this total was computed, including allowances for contingencies, interest during construction, engineering and design, supervision and administration, at the rates used in computing investment for all specific power facilities. Investment thus computed, to be incurred in 50 years after project completion, was reduced to present worth and an annual charge computed for interest and amortization over a period of 100 years. The result was approximately equivalent to 0.42 percent of investment in the powerplant and this figure was adopted for computing annual charges in all plans considered for Portage and the adjoining pumped storage plan for Mt. Morris reservoir. For the smaller scale developments at Mt. Morris Dam, a similar computation was made using 80 percent of powerhouse and substation costs in estimating the major replacement item.

b. Other charges. Interim replacement charges, administration and general charges were based on percentages generally used by the Federal Power Commission. Operation and maintenance charges were taken from a curve of cost per kilowatt of capacity derived from an estimated escalation of figures used in a prior study. This curve is shown on

figure 3. An additional charge, not tabulated above, was added for plans requiring Mt. Morris pool at elevation 697 feet, higher than the elevation of 680 feet assumed desirable for other purposes. Annual cost of the incremental replacement flood control storage required in Portage reservoir for the higher Mt. Morris pool was considered a separable cost to power and would be about $30,000. Annual charges are shown on table L-17.


ESTIMATED ANNUAL CHARGES
OPERATION AND MAINTENANCE OF POWER FACILITIES
ANNUAL CHARGES FOR O. AND M.
DOLLARS PER KW.
12.00
8.00
4.00
0
0
100
200
300
PLANT CAPACITY IN MEGAWATTS

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FIGURE 3

TABLE L-17. Summary of annual charges

DESCRIPTION	PLAN A		PLAN B	PLAN C		PLAN D	
	Portage	Mt. Morris (1)	Portage	Portage	Mt. Morris (1)	Mt. Morris (2)	Mt. Morris (1)
Capacity in kilowatts	50,000	20,000	150,000	200,000	3,700	310,000	3,700
Type of development	Conv.	Conv.	Conv.	Pump	Conv.	Pump	Conv.
First cost ($1,000)	22,750	7,260	41,100	44,500	3,320	43,380	3,320
Interest during construction ($1,000)	1,450	230	2,600	2,800	100	2,720	100
Investment ($1,000)	24,200	7,490	43,700	47,300	3,420	46,100	3,420
Annual charges ($1,000)							
Interest	756	234	1,366	1,478	107	1,441	107
Amortization	37	11	66	71	5	70	5
Interim replacements	48	15	87	95	7	92	7
Major replacements	43	34	74	111	11	144	11
Operation and maintenance	175	107	368	462	58	698	58
Administration and general	61	38	129	162	70	244	20
Subtotal	1,120	439	2,090	2,379	208	2,689	208
Pumping energy	-	-	-	441	-	2,181	-
Incremental cost of flood control	30	-	-	30	-	30	-
TOTAL ANNUAL CHARGES	1,150	439	2,090	2,850	208	4,900	208

(1) At existing dam.
(2) Pumped storage, adjoining reservoir.

22. ESTIMATES OF BENEFITS

The economic feasibility of any potential hydroelectric project is usually determined from a comparison of the annual cost and annual value of its output. Annual costs include fixed charges on investment, productive expenses, and administrative and general expenses. Annual value is measured by the cost of an equivalent supply of power from an alternative and equally dependable source. The values used in this appendix are at the high-tension side of the step-up substation of the hydroelectric project expressed in terms of two components:

(1) A capacity value in dollars per kilowatt-year of dependable capacity; and

(2) An energy value in mills per kilowatt-hour of the project's average annual output.

a. Types of alternatives considered. An alternative to a proposed hydroelectric project can be almost any of the various types of power plants built and operated at the present time by the utility industry. Included among them are conventional and peaking steam-electric stations, nuclear plants, pumped-storage hydropower developments, jet engine gas turbine and diesel-driven electric power plants. However, the appropriate alternative to be used should be of the type most likely to be built in the absence of the proposed project. Furthermore, it should be of the type for which an adequate record of performance, costs and physical characteristics are readily available. Various adjustments are applied to the power values to allow for inherent physical and operating differences between the proposed hydro project and its alternative.

b. Power values for Portage. The New York Regional Office, Federal Power Commission examined several potential projects for the Genesee River Basin Survey. The alternative considered most appropriate by the Federal Power Commission would be a conventional steam-electric station located in the vicinity of Rochester, New York, with generating units of 400 to 500 megawatts each costing $130 per kilowatt, 1 January 1966 price levels. Annual costs would depend primarily on the financing method used for obtaining the necessary funds for the alternative station and its associated facilities and for the hydro transmission lines. Therefore, based on the above considerations, the at-site capacity and energy values suitable for the economic analyses of a potential hydroelectric development for the Portage complex, based on private and federal financing as shown in Supplement A are as follows:

	Privately-financed alternative project	Federally-financed alternative project
Dependable capacity	$19/kw/yr	$10/kw/yr
Energy	2.3 mills/kwh	2.3 mills/kwh
Cost of pumping energy	3.0 mills/kwh	3.0 mills/kwh

c. Downstream benefits. Benefits would accrue to existing downstream hydroelectric plants through additional flow regulation for the Genesee River. Plant capacities are small and detailed study of benefits was not considered warranted for this appendix. Generalized curves of increased annual energy generation at downstream plants were available from prior studies and would provide annual benefits between $10,000 and $60,000 for the range of minimum regulated flows in plans considered. These benefits were not included in the computations. Estimated average annual benefits for this study are given in table L-18.

TABLE L-18. Estimates of benefits

Description	Capacity (mw)	Energy (mwh)	Average annual benefits ($1,000) Based on privately-financed alternative (3) Capacity	Energy	Total	Based on Federally-financed alternative (4) Capacity	Energy	Total
Plan A - Portage	50	154,000	950	350	1,300	500	350	850
Mt. Morris (1)	20	69,000	380	159	539	200	159	359
Plan B - Portage	150	211,000	2,850	490	3,340	1,500	490	1,990
Plan C - Portage	200	370,000	3,800	850	4,650	2,000	850	2,850
Mt. Morris (1)	3.7	19,500	70	45	115	37	45	82
Plan D - Mt. Morris (2)	310	484,000	5,890	1,110	7,000	3,100	1,110	4,210
Mt. Morris (1)	3.7	19,500	70	45	115	37	45	82

(1) At existing dam.
(2) Pumped storage, adjoining reservoir.
(3) Capacity value, $19.00/kw; energy value, 2.3 mills/kwh
(4) Capacity value, $10.00/kw; energy value, 2.3 mills/kwh.

23. BENEFIT-COST COMPARISONS

a. Benefit-cost ratios. Annual benefits computed from power values based on private financing of the alternative project, were divided by annual costs for specific power facilities to obtain a benefit-cost ratio for each plan investigated. Ratios are shown in table L-19 below. In a Federal multiple-purpose project, average annual power benefits must at least equal separable costs for power development. Specific costs presented in this appendix will approximate separable power costs in multiple-purpose plans. Reference to table L-19 will show that benefits would exceed costs for each plan of development at the Portage site, for the adjoining pumped storage plan for Mt. Morris reservoir, and for the larger of the two capacities considered for conventional development at Mt. Morris Dam.

b. Comparability ratios. The comparability test is required in the economic evaluation of all Corps of Engineers multiple-purpose projects in which hydroelectric power is being considered as a purpose. It is one of the four criteria outlined in Section V C 2 of Senate Document No. 97, 87th Congress for use in project formulation and evaluation. The criterion requires that separable costs for power must be no greater than the cost of the most likely alternative, steam-electric in the case of Portage, financed on a basis comparable to that used for the hydroelectric project. Thus costs that would result if the alternative were Federally-financed were determined by the Federal Power Commission and are tabulated as power values in paragraph 22. These costs are also used to limit benefits in cost allocation studies. "Comparability benefits" based on power values with Federal financing were divided by annual power charges for each plan considered to obtain comparability ratios included in table L-19. Reference to the table will show that only the integral-type pumped storage plan developed for the Portage project would meet the test for comparability under the criteria and procedures adopted for this appendix.

TABLE L-19. Benefit-cost comparisons

Description	Capacity (mw)	Annual cost ($1,000)	Annual benefits ($1,000)	Benefit cost ratio	Comparability benefits ($1,000)	Comparability ratio
Plan A -						
Portage	50	1,150	1,300	1.1	850	0.7
Mt. Morris (1)	20	439	539	1.2	359	0.8
Plan B -						
Portage	150	2,090	3,340	1.6	1,990	0.95
Plan C -						
Portage	200	2,850	4,650	1.6	2,850	1.0
Mt. Morris (1)	3.7	208	115	0.6	82	0.4
Plan D -						
Mt. Morris (2)	310	4,900	7,000	1.4	4,210	0.9
Mt. Morris (1)	3.7	208	115	0.6	82	0.4

(1) At existing dam.
(2) Pumped storage, adjoining reservoir.

24. FINANCIAL FEASIBILITY

If hydroelectric power were to be included in a multiple-purpose project as a Federal undertaking, total annual costs allocated to power would have to be recovered from sale of power by the marketing agency. These costs, based on an economic life of 100 years, are required to be amortized during a 50-year period for repayment purposes. In the Genesee River basin the marketing agency for Federally-developed power would be the United States Department of the Interior, and determination of financial feasibility would be made by the Department. This determination requires complete data on power output, separable costs, total allocated costs, costs of alternatives and power benefits for any multiple-purpose plans considered. A representative of the Office of Water and Power Development, Department of the Interior, has participated in meetings of the power task group and has provided technical assistance. He has also advised that feasibility studies could assume that the market would absorb all power which could be economically developed at Federal projects in the Genesee River Basin.

SUMMARY

25. GENERAL

Hydroelectric power investigations have presupposed certain operating procedures and scales of development for key projects. Plan modifications which would decrease storage available for flow regulation, or which would require release schedules resulting in decreased dependable flow would reduce potential benefits from power. Additional projects proposed for other purposes and located upstream from the Portage site could provide added storage with the potential for increased dependable flow and reduced pumping energy requirements.

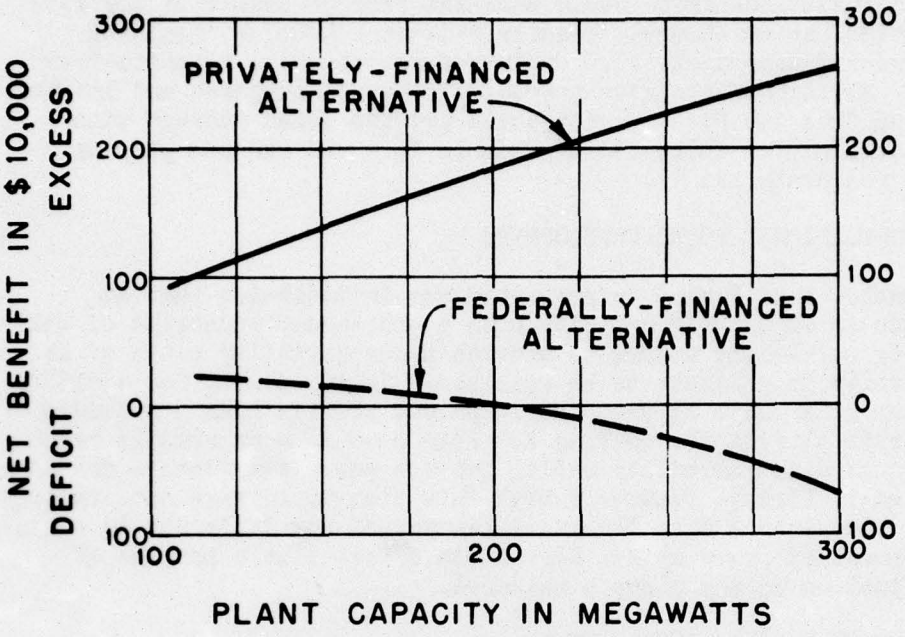
26. CONVENTIONAL POWER DEVELOPMENT

Analysis of Plan A as presented herein indicates that an increase in dependable capacity with a consequent reduction of unit costs of sufficient degree to provide a comparability ratio of at least unity is unlikely to be realized. In any event, the addition of reversible units as proposed in pumped storage Plan C provides a superior alternative to Plan A. Plan B could more readily reach the required comparability ratio, but the relatively severe drawdown required in Portage reservoir with this plan would make satisfactory integration into a plan for multiple-purpose use difficult to achieve. Development of power at Mt. Morris Dam offers little promise of justification in any plans considered.

27. PUMPED STORAGE DEVELOPMENT

Pumped storage of the integral type as proposed in Plan C and utilizing Portage and Mt. Morris reservoirs as upper and lower pools, respectively, would be compatible with other nonconsumptive project purposes and appears capable of justification under criteria and operating procedures adopted for the power analysis. Plans of lesser and greater capacity than the 200,000 kilowatt plan described were also investigated. Curves of net benefits and benefit-cost comparisons shown in figure 4 were used in preliminary plan formulation studies to estimate the economic effects of including power in a considered plan. Similar curves derived for Plan D, the adjoining type pumped storage development plan, are shown on figure 5. The curves show that this type of development would not provide a comparability ratio of unity within the limits of capacity which could be provided with the allowable range of Mt. Morris pool fluctuation.

PLAN FORMULATION CURVES
PLAN C



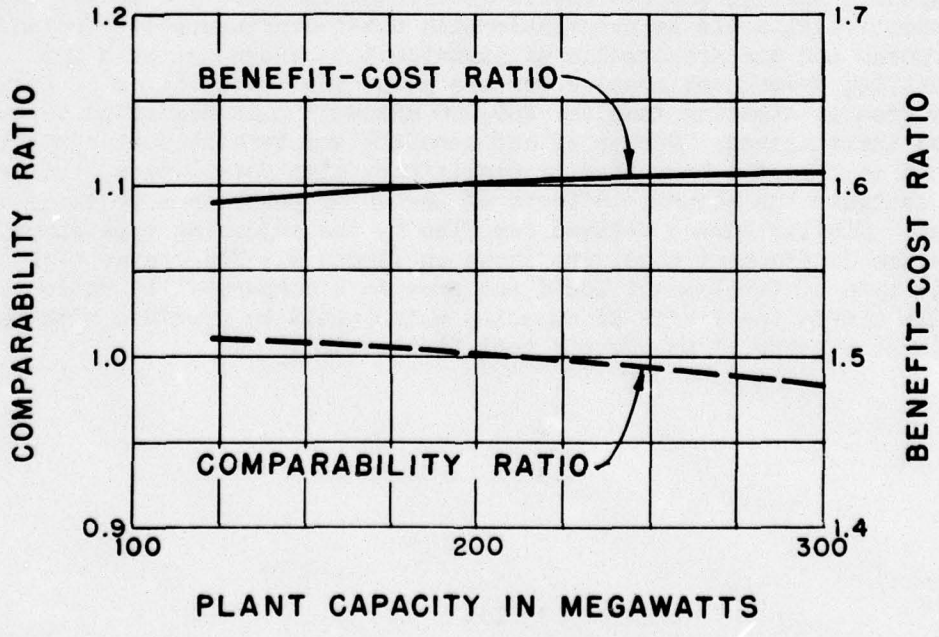
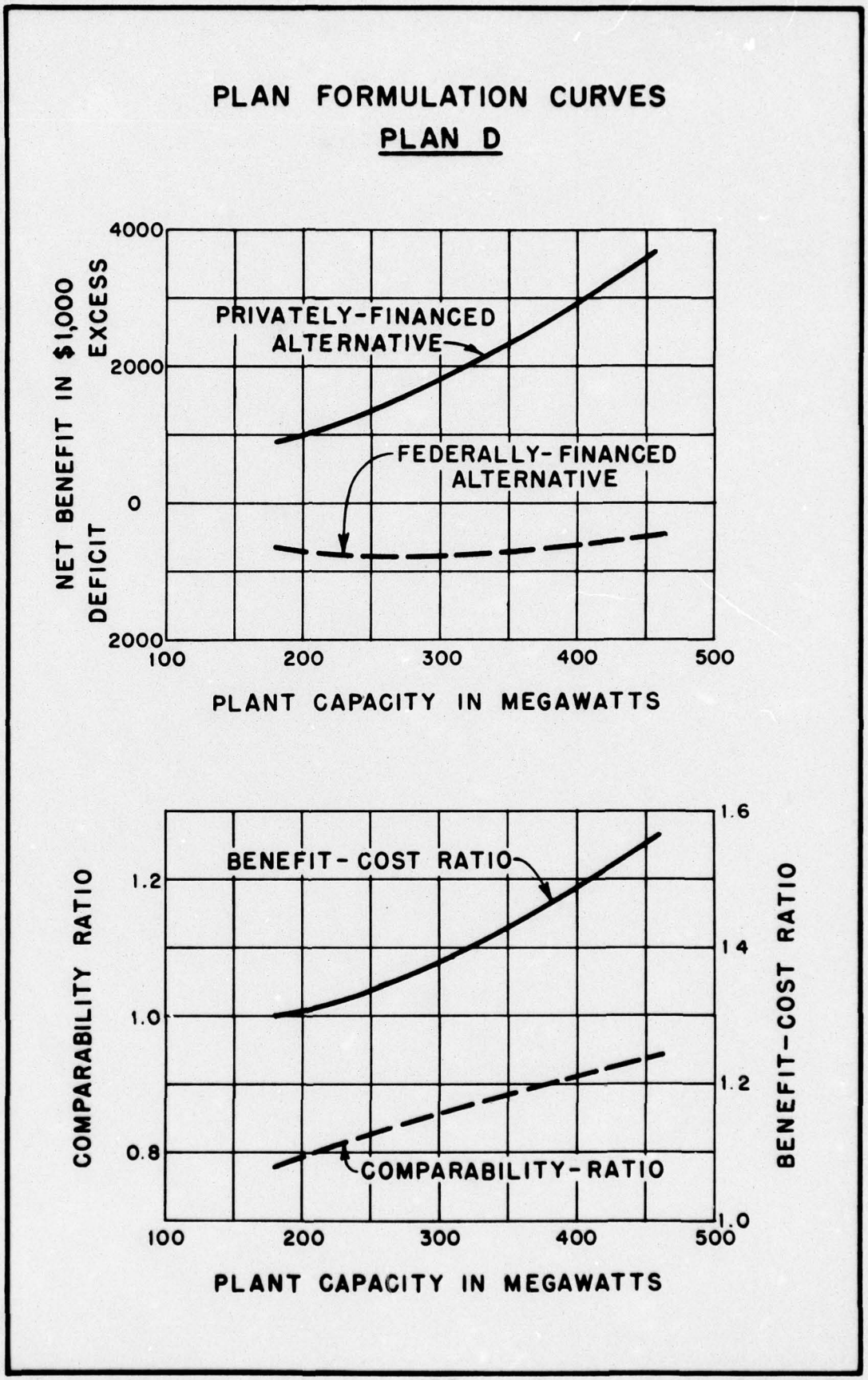
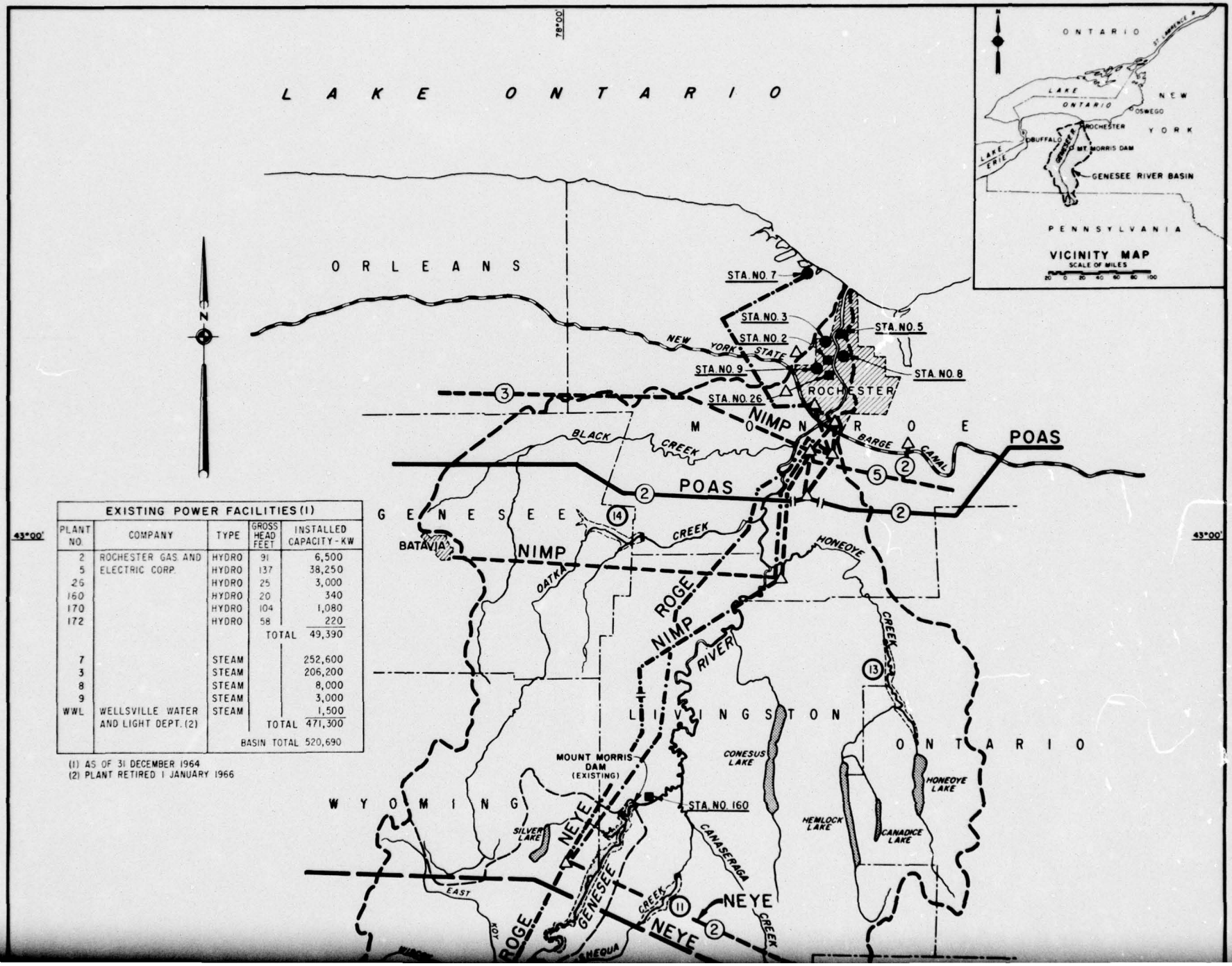


FIGURE 4


PLAN FORMULATION CURVES
PLAN D
NET BENEFIT IN $1,000
EXCESS
DEFICIT
4000
2000
0
2000
PRIVATELY-FINANCED
ALTERNATIVE
FEDERALLY-FINANCED
ALTERNATIVE
100
200
300
400
500
PLANT CAPACITY IN MEGAWATTS
COMPARABILITY RATIO
1.2
1.0
0.8
BENEFIT-COST RATIO
COMPARABILITY-RATIO
1.6
1.4
1.2
1.0
100
200
300
400
500
PLANT CAPACITY IN MEGAWATTS

L53

FIGURE 5



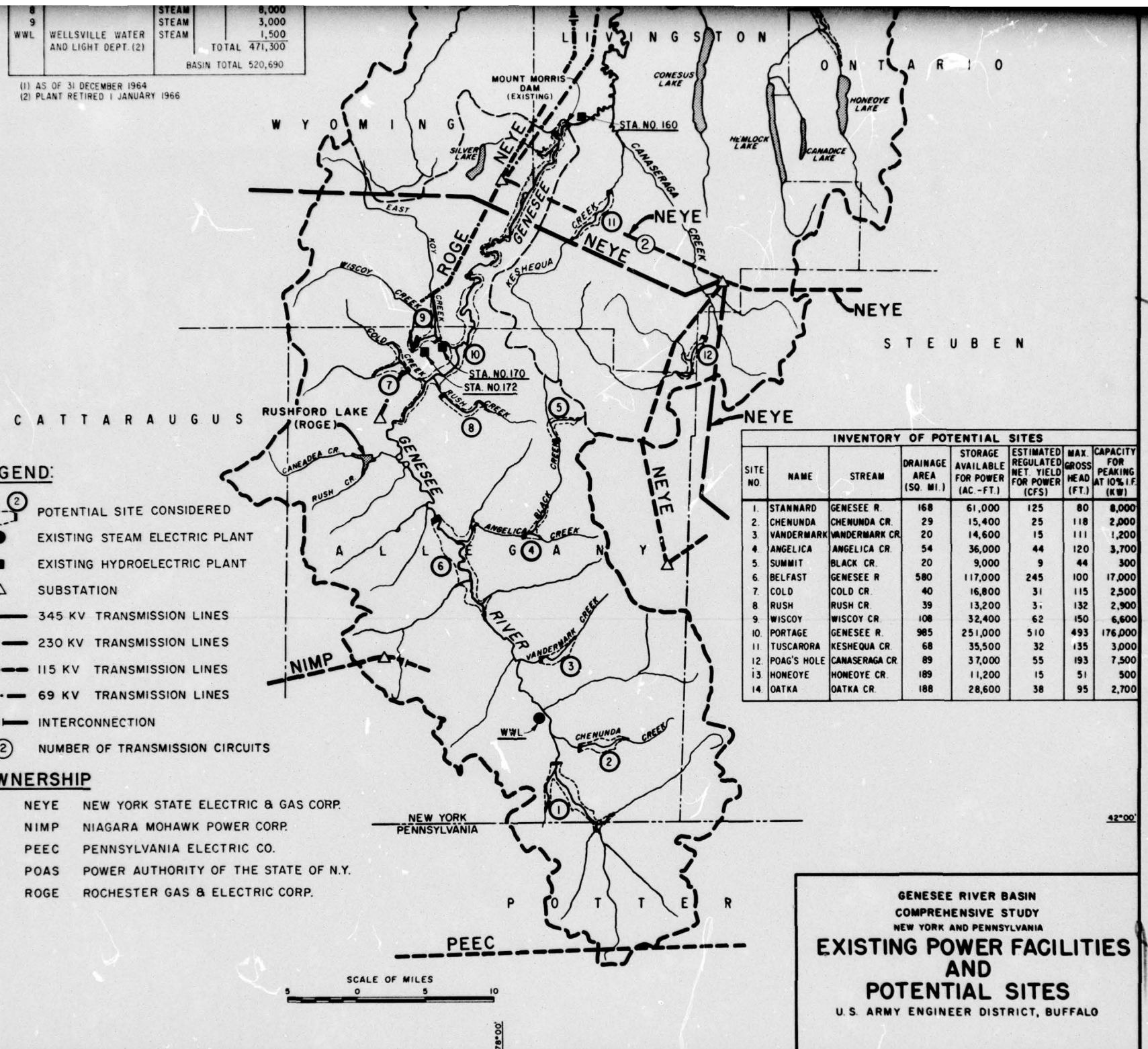
EXISTING POWER FACILITIES (1)				
PLANT NO.	COMPANY	TYPE	GROSS HEAD FEET	INSTALLED CAPACITY - KW
2	ROCHESTER GAS AND	HYDRO	91	6,500
5	ELECTRIC CORP.	HYDRO	137	38,250
26		HYDRO	25	3,000
160		HYDRO	20	340
170		HYDRO	104	1,080
172		HYDRO	58	220
			TOTAL	49,390
7		STEAM		252,600
3		STEAM		206,200
8		STEAM		8,000
9		STEAM		3,000
WWL	WELLSVILLE WATER	STEAM		1,500
	AND LIGHT DEPT. (2)		TOTAL	471,300
			BASIN TOTAL	520,690

(1) AS OF 31 DECEMBER 1964
(2) PLANT RETIRED 1 JANUARY 1966

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8		STEAM	8,000
9		STEAM	3,000
WWL	WELLSVILLE WATER AND LIGHT DEPT. (2)	STEAM	1,500
		TOTAL	471,300
		BASIN TOTAL	520,690

(1) AS OF 31 DECEMBER 1964
(2) PLANT RETIRED 1 JANUARY 1966



LEGEND:

- (2) POTENTIAL SITE CONSIDERED
- ● EXISTING STEAM ELECTRIC PLANT
- ■ EXISTING HYDROELECTRIC PLANT
- △ SUBSTATION
- 345 KV TRANSMISSION LINES
- 230 KV TRANSMISSION LINES
- 115 KV TRANSMISSION LINES
- 69 KV TRANSMISSION LINES
- INTERCONNECTION
- (2) NUMBER OF TRANSMISSION CIRCUITS

OWNERSHIP

NEYE	NEW YORK STATE ELECTRIC & GAS CORP.
NIMP	NIAGARA MOHAWK POWER CORP.
PEEC	PENNSYLVANIA ELECTRIC CO.
POAS	POWER AUTHORITY OF THE STATE OF N.Y.
ROGE	ROCHESTER GAS & ELECTRIC CORP.

INVENTORY OF POTENTIAL SITES

SITE NO.	NAME	STREAM	DRAINAGE AREA (SQ. MI.)	STORAGE AVAILABLE FOR POWER (AC.-FT.)	ESTIMATED REGULATED NET. YIELD FOR POWER (CFS)	MAX. GROSS HEAD (FT.)	CAPACITY FOR PEAKING AT 10% L.F. (KW)
1.	STANNARD	GENESEE R.	168	61,000	125	80	8,000
2.	CHENUNDA	CHENUNDA CR.	29	15,400	25	118	2,000
3.	VANDERMARK	VANDERMARK CR.	20	14,600	15	111	1,200
4.	ANGELICA	ANGELICA CR.	54	36,000	44	120	3,700
5.	SUMMIT	BLACK CR.	20	9,000	9	44	300
6.	BELFAST	GENESEE R	580	117,000	245	100	17,000
7.	COLD	COLD CR.	40	16,800	31	115	2,500
8.	RUSH	RUSH CR.	39	13,200	31	132	2,900
9.	WISCOY	WISCOY CR.	108	32,400	62	150	6,600
10.	PORTAGE	GENESEE R.	985	251,000	510	493	176,000
11.	TUSCARORA	KESHEQUA CR.	68	35,500	32	135	3,000
12.	POAG'S HOLE	CANASERAGA CR.	89	37,000	55	193	7,500
13.	HONEOYE	HONEOYE CR.	189	11,200	15	51	500
14.	OATKA	OATKA CR.	188	28,600	38	95	2,700

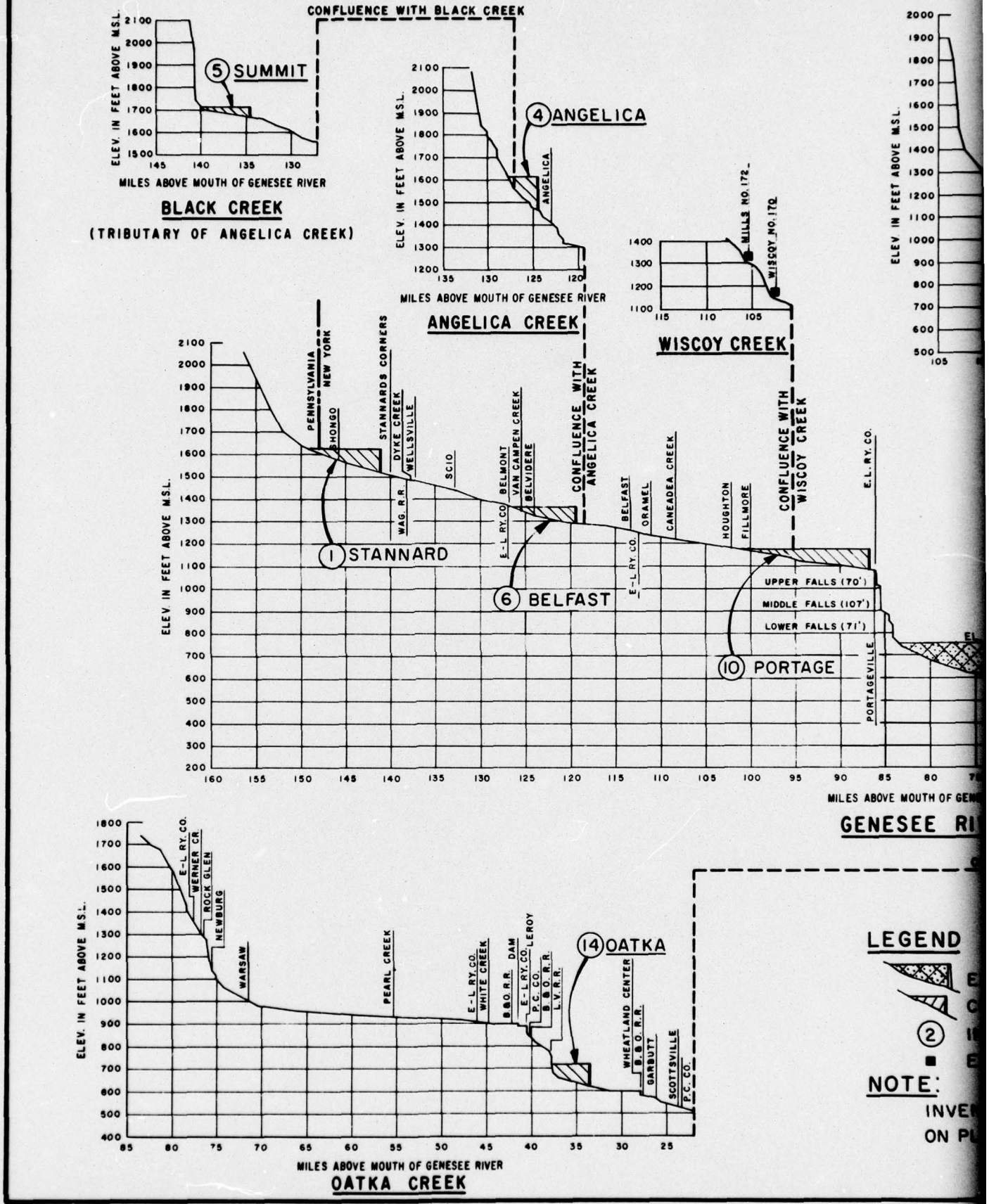
GENESEE RIVER BASIN
COMPREHENSIVE STUDY
NEW YORK AND PENNSYLVANIA

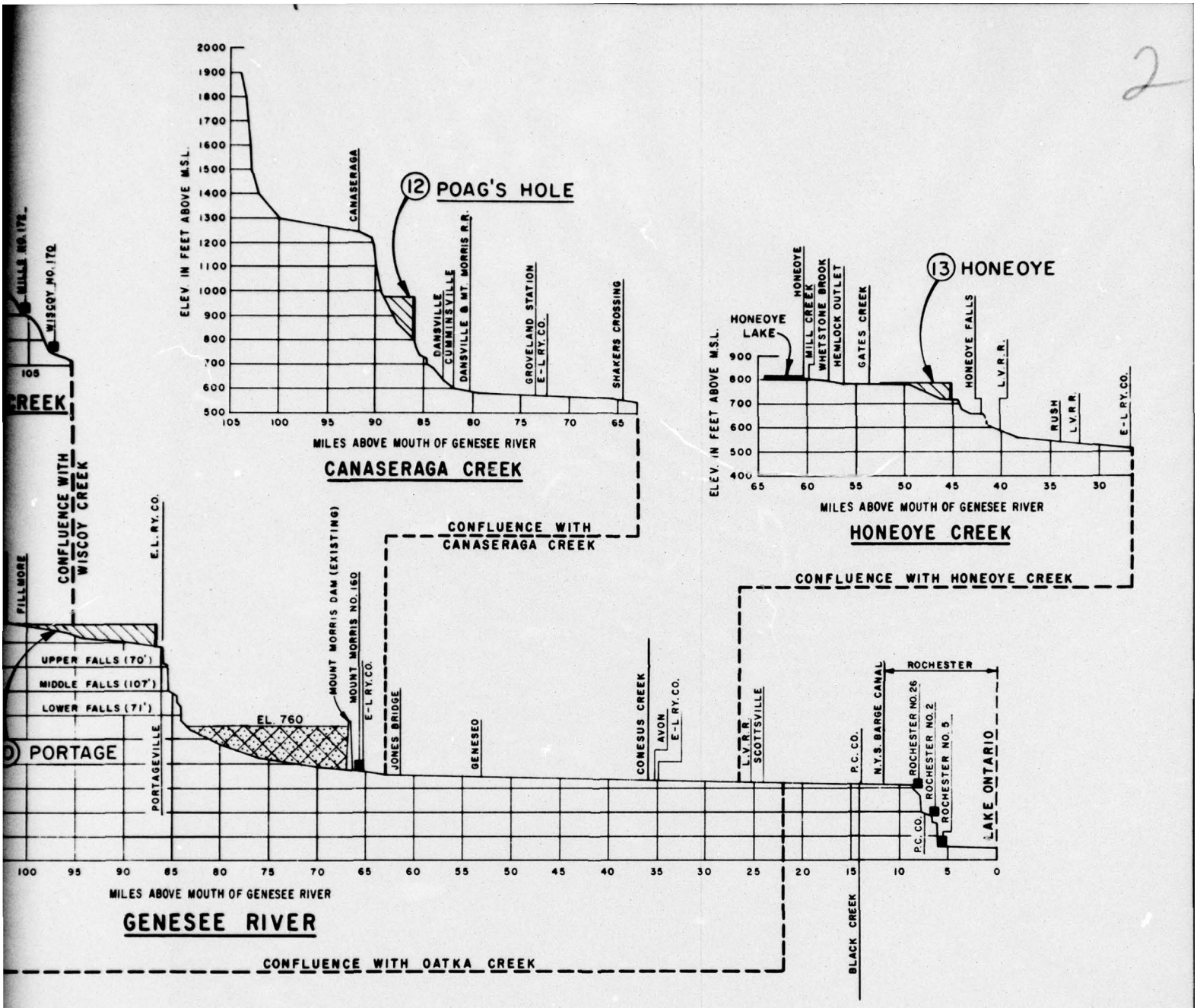
EXISTING POWER FACILITIES AND POTENTIAL SITES

U.S. ARMY ENGINEER DISTRICT, BUFFALO

PLATE L1

PLATE L1


CONFLUENCE WITH BLACK CREEK
ELEV. IN FEET ABOVE M.S.L.
5 SUMMIT
MILES ABOVE MOUTH OF GENESEE RIVER
BLACK CREEK
(TRIBUTARY OF ANGELICA CREEK)
4 ANGELICA
ANGELICA
MILES ABOVE MOUTH OF GENESEE RIVER
ANGELICA CREEK
MILLS NO. 172
WISCOY NO. 172
WISCOY CREEK
PENNSYLVANIA
NEW YORK
SHONGO
STANNARDS CORNERS
DYKE CREEK
WELLSVILLE
WAG. R.R.
SCIO
E-L RY. CO.
BELMONT
VAN CAMPEN CREEK
BELVIDERE
CONFLUENCE WITH ANGELICA CREEK
BELFAST
ORAMEL
CANEADEA CREEK
HOUGHTON
FILLMORE
CONFLUENCE WITH WISCOY CREEK
E.L. RY. CO.
1 STANNARD
6 BELFAST
10 PORTAGE
UPPER FALLS (70')
MIDDLE FALLS (107')
LOWER FALLS (71')
PORTAGEVILLE
MILES ABOVE MOUTH OF GENESEE RIVER
GENESEE RI
E-L RY. CO.
WERNER CR.
ROCK GLEN
NEWBURG
WARSAW
PEARL CREEK
E-L RY. CO.
WHITE CREEK
B&O R.R. DAM
E-L RY. CO.
P.C. CO.
B&O R.R.
L.V.R.R.
LEROY
14 OATKA
WHEATLAND CENTER
B.&O.R.R.
GARBUTT
SCOTTSVILLE
P.C. CO.
MILES ABOVE MOUTH OF GENESEE RIVER
OATKA CREEK
LEGEND
NOTE:
INVE
ON PL



LEGEND

- EXISTING RESERVOIR
- CONSIDERED RESERVOIR
- (2) INVENTORY IDENTIFICATION NUMBER
- ■ EXISTING POWER PLANT

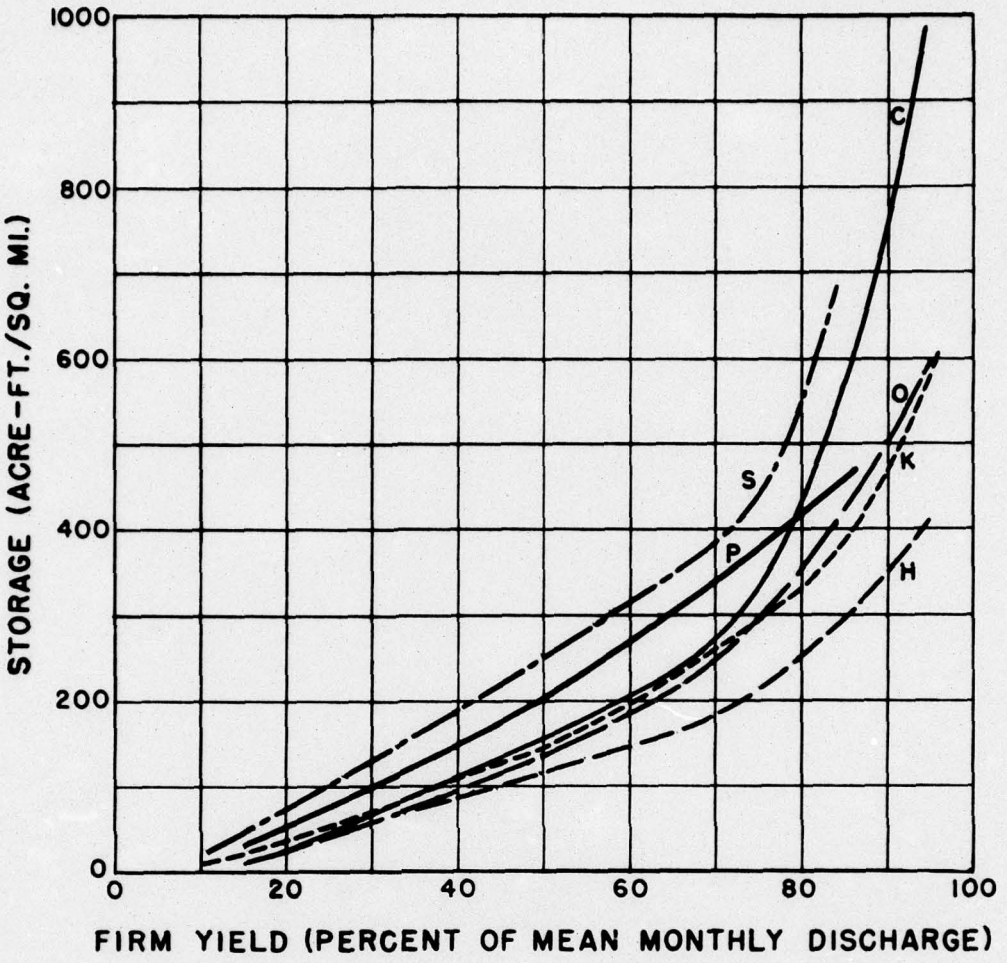
NOTE:

INVENTORY SITES NOT SHOWN ARE INCLUDED ON PLATE L-1.

GENESEE RIVER BASIN
COMPREHENSIVE STUDY
NEW YORK AND PENNSYLVANIA

PROFILES OF GENESEE RIVER AND SELECTED TRIBUTARIES

U.S. ARMY ENGINEER DISTRICT, BUFFALO



LEGEND

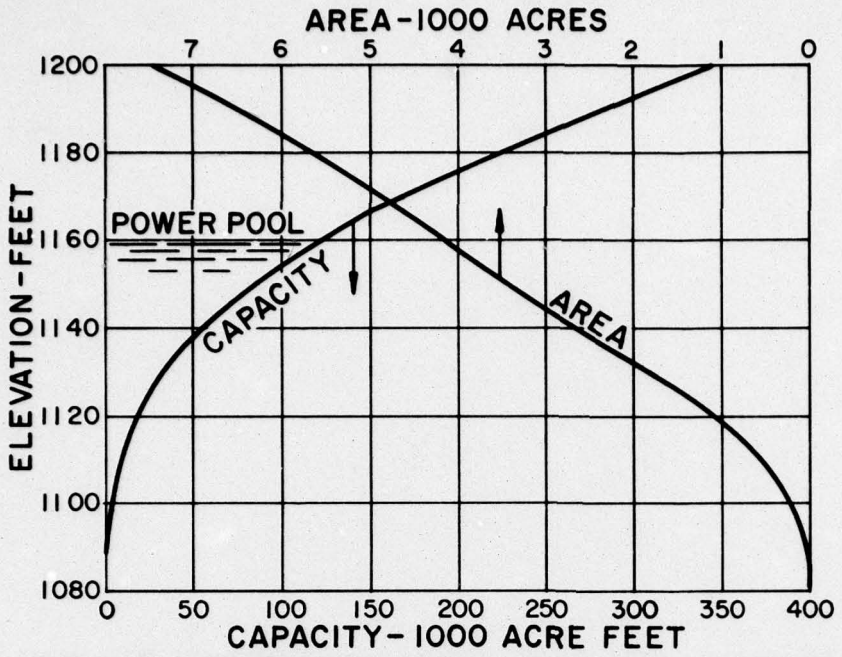
- S — Genesee River (Scio)
- P — Genesee River (Portageville)
- C — Ganaseraga Creek
- O — Oatka Creek
- K — Keshequa Creek
- H — Honeoye Creek

GENESEE RIVER BASIN
COMPREHENSIVE STUDY
NEW YORK AND PENNSYLVANIA

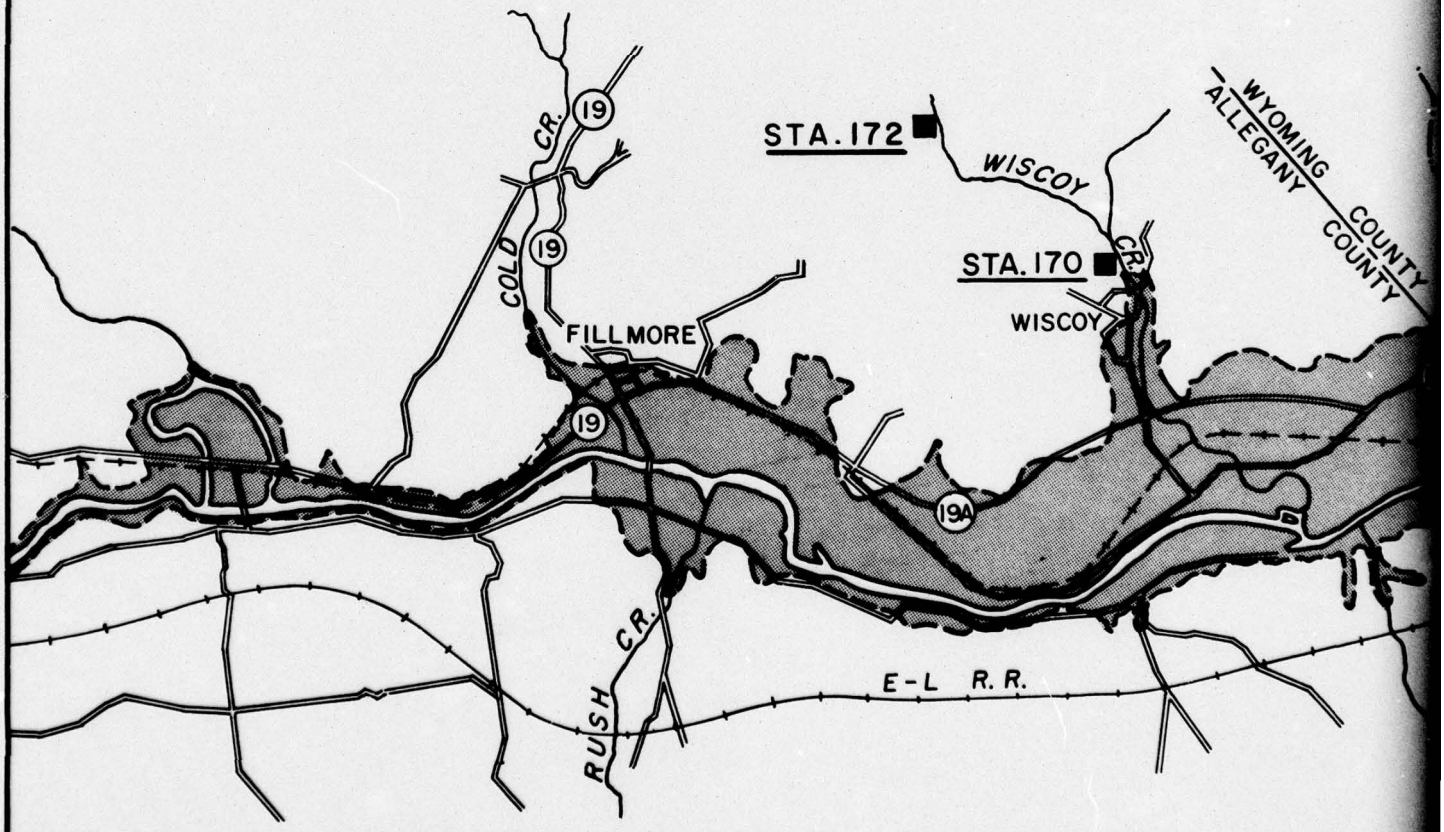
STORAGE-YIELD RELATIONS

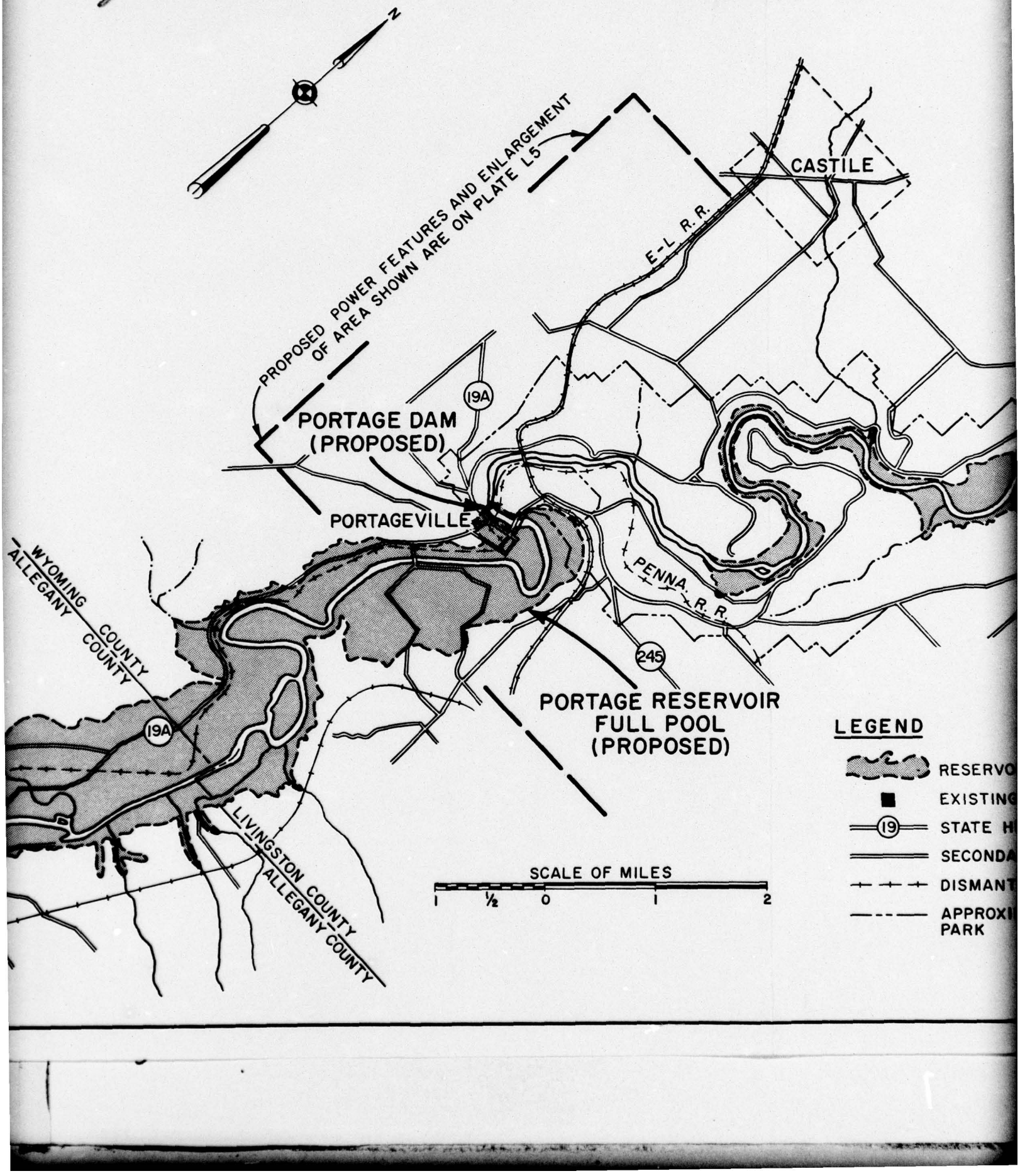
U.S. ARMY ENGINEER DISTRICT, BUFFALO

PLATE L 3

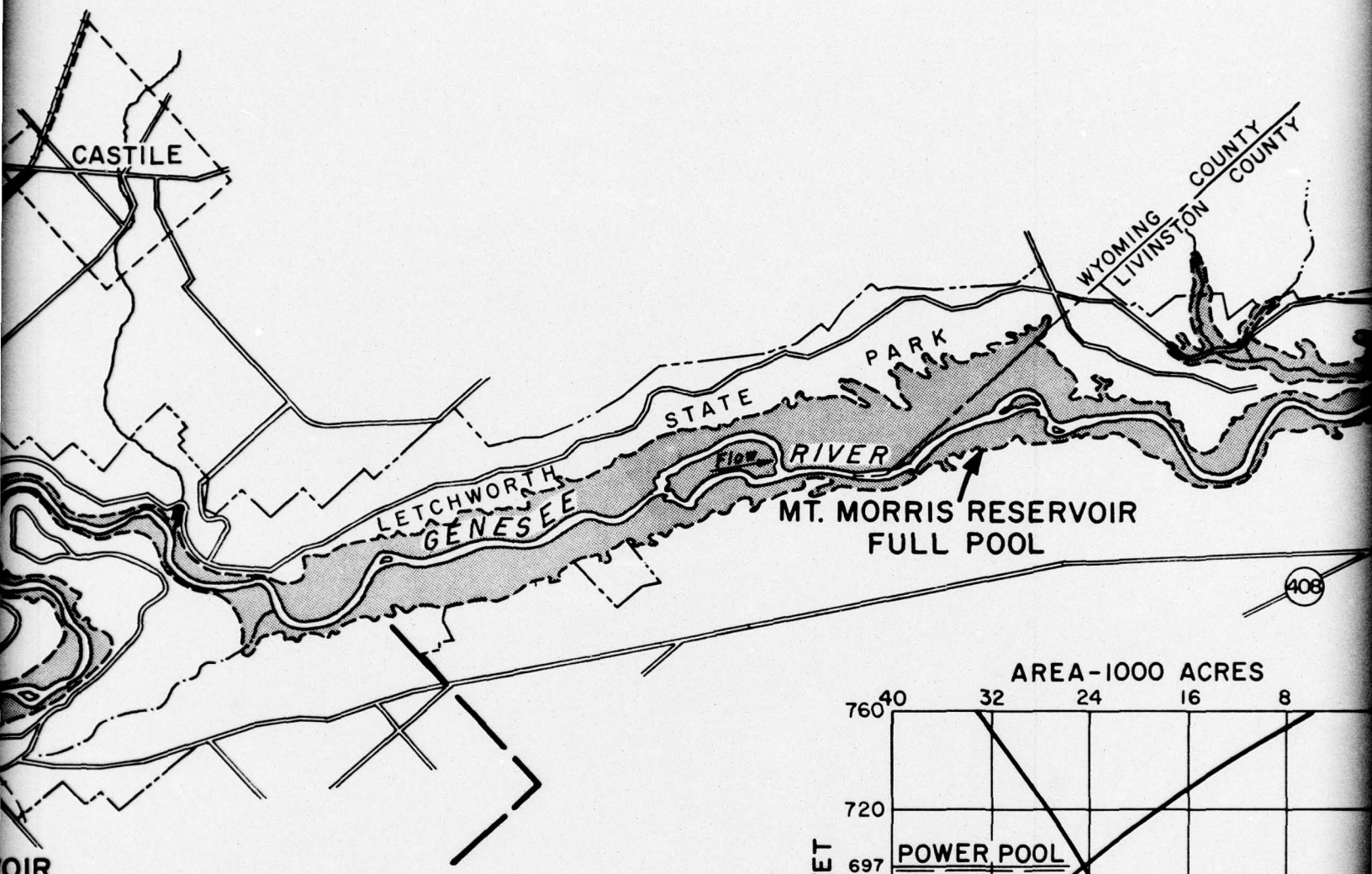


PORTAGE RESERVOIR AREA-CAPACITY CURVES




N
PROPOSED POWER FEATURES AND ENLARGEMENT OF AREA SHOWN ARE ON PLATE L5
CASTILE
E-L R.R.
19A
PORTAGE DAM (PROPOSED)
PORTAGEVILLE
PENNA. R.R.
245
PORTAGE RESERVOIR FULL POOL (PROPOSED)
WYOMING COUNTY
ALLEGANY COUNTY
19A
LIVINGSTON COUNTY
ALLEGANY COUNTY
SCALE OF MILES
1 ½ 0 1 2
LEGEND
RESERVO
EXISTING
19 STATE H
SECONDA
DISMANT
APPROXI
PARK

3

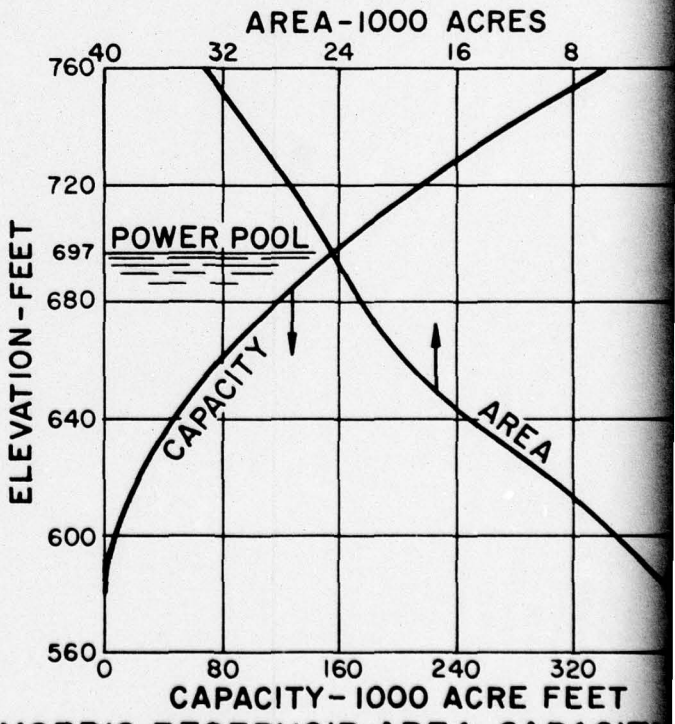


OIR

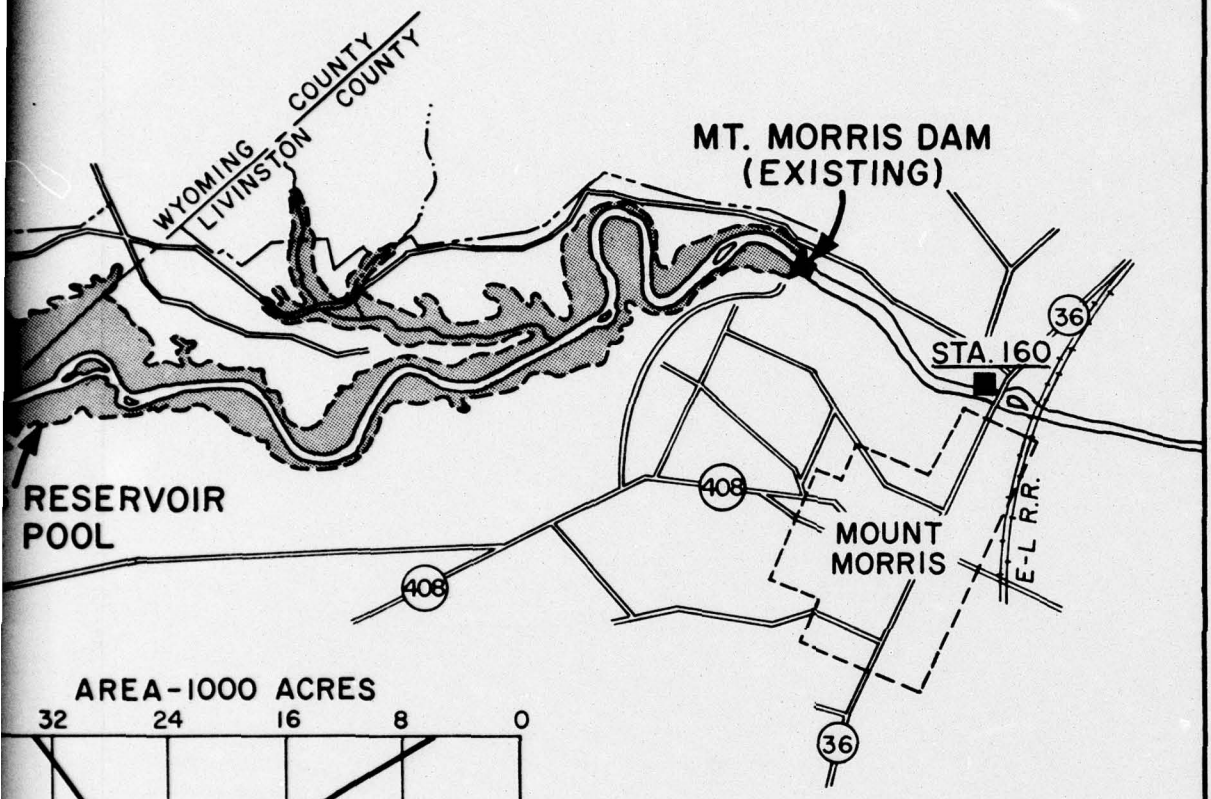
LEGEND

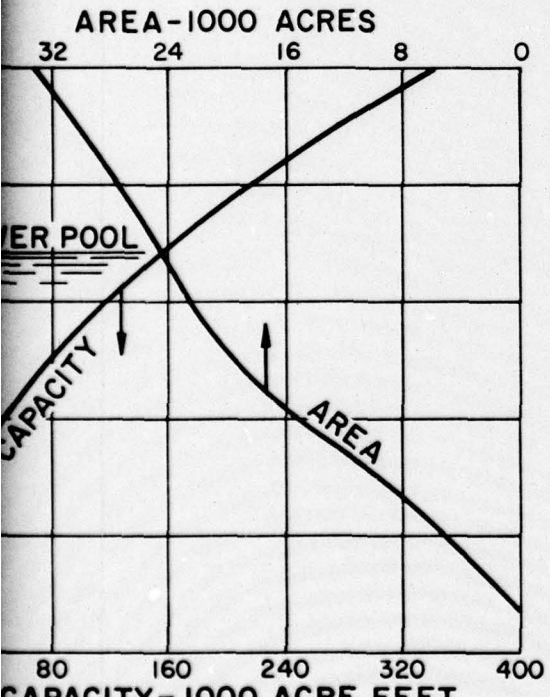
- RESERVOIR POOL
- EXISTING HYDROELECTRIC PLANT
- (19) STATE HIGHWAY
- SECONDARY ROAD
- DISMANTLED RAILROAD
- APPROXIMATE BOUNDARY LETCHWORTH PARK

2



MT. MORRIS RESERVOIR AREA-CAPACITY





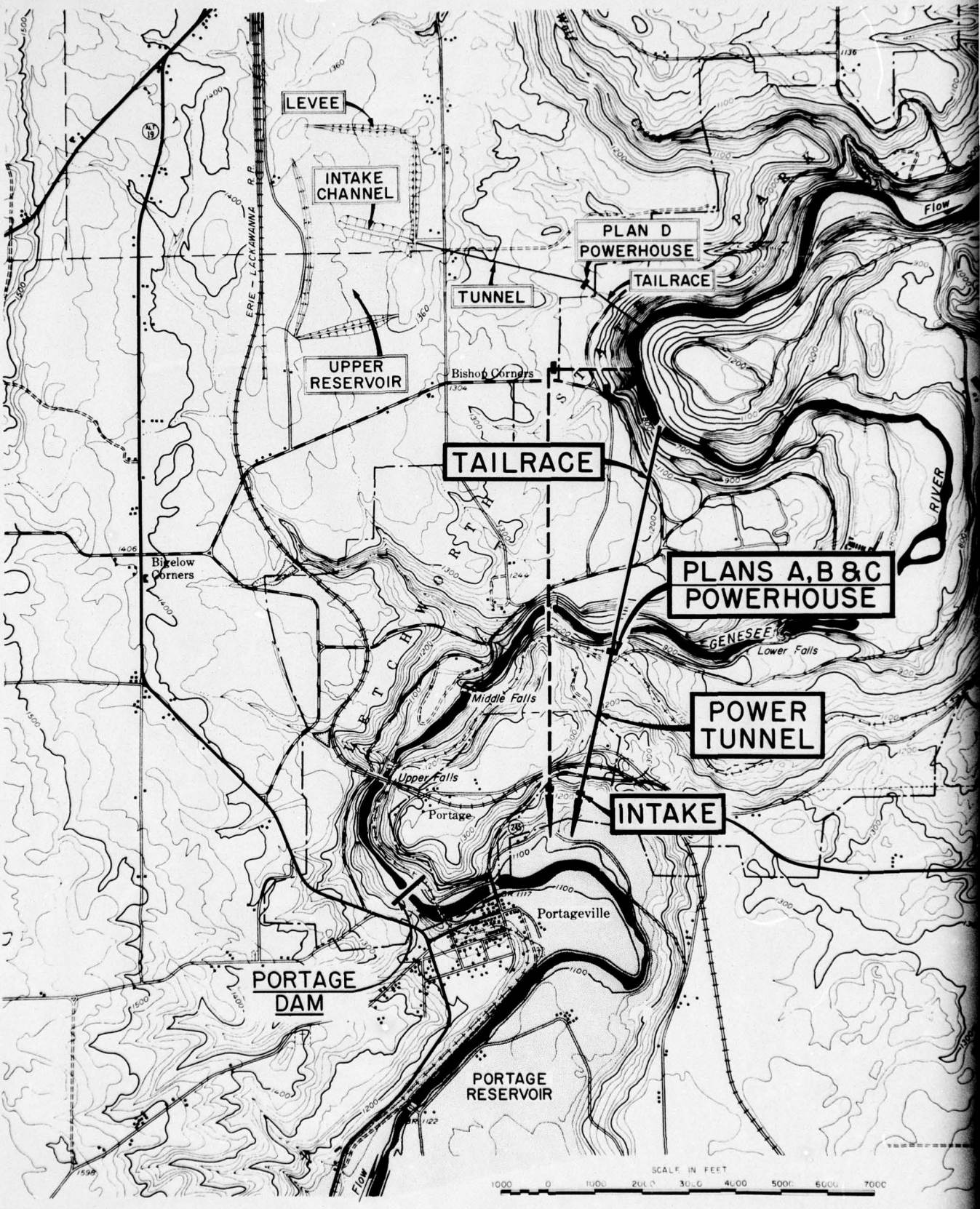
ESERVOIR AREA-CAPACITY CURVES

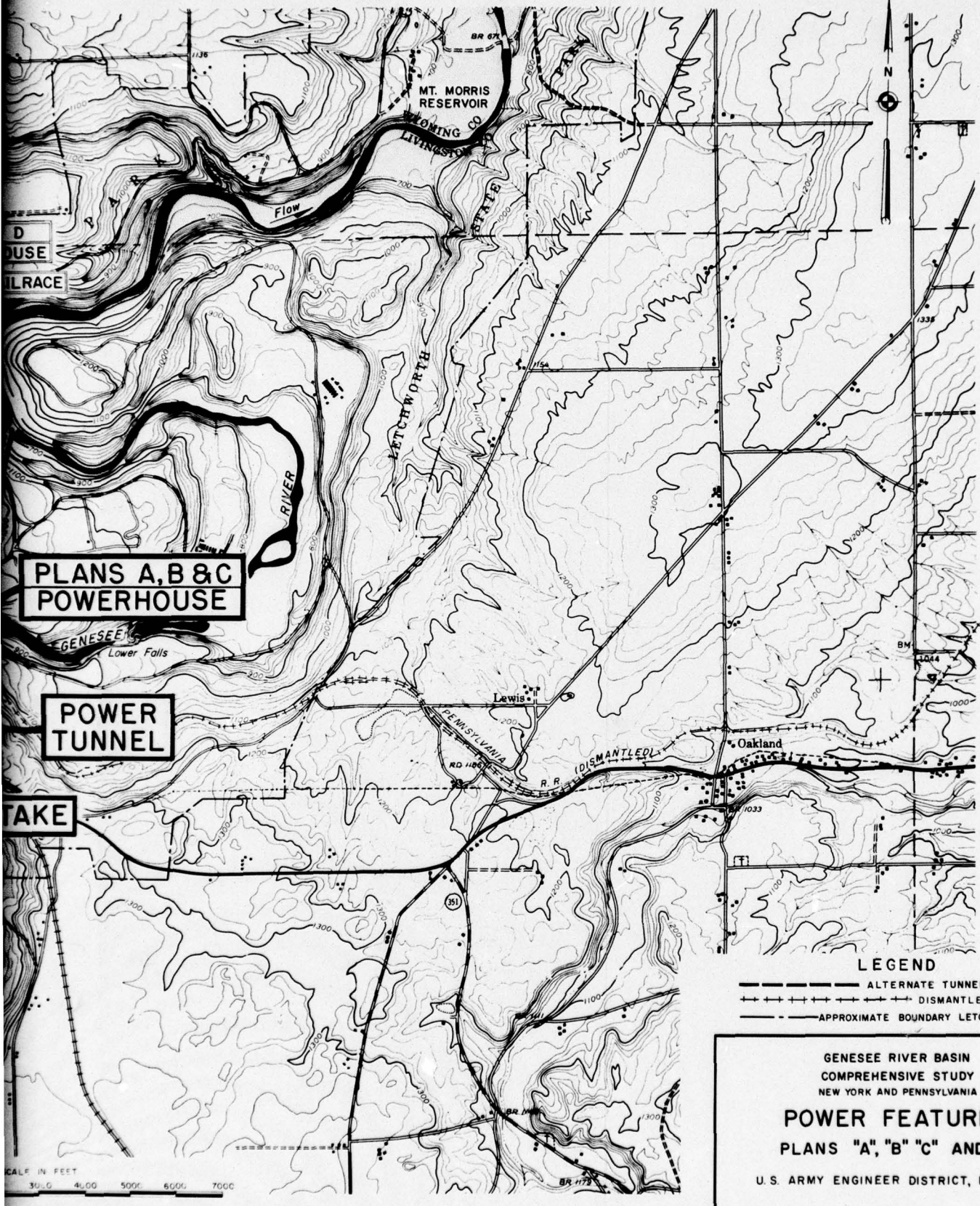
GENESEE RIVER BASIN
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NEW YORK AND PENNSYLVANIA

MT. MORRIS-PORTAGE SYSTEM

U.S. ARMY ENGINEER DISTRICT, BUFFALO

PLATE L4


LEVEE
INTAKE CHANNEL
ERIE - LACKAWANNA R.R.
PLAN D POWERHOUSE
TAILRACE
TUNNEL
UPPER RESERVOIR
Bishop Corners
TAILRACE
PLANS A, B & C POWERHOUSE
GENESEE RIVER
Lower Falls
Middle Falls
POWER TUNNEL
Upper Falls
Portage
INTAKE
Portageville
PORTAGE DAM
PORTAGE RESERVOIR
Bixelow Corners
Flow
SCALE IN FEET
1000 0 1000 2000 3000 4000 5000 6000 7000



LEGEND

ALTERNATE TUNNEL ALIGNMENT

DISMANTLED RAILROAD

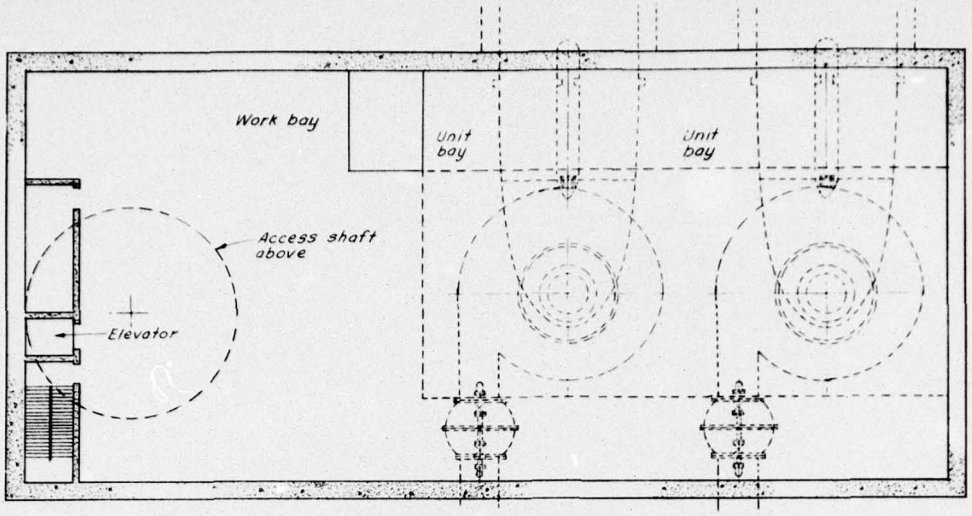
APPROXIMATE BOUNDARY LETCHWORTH PARK

GENESEE RIVER BASIN
COMPREHENSIVE STUDY
NEW YORK AND PENNSYLVANIA

POWER FEATURES
PLANS "A", "B" "C" AND "D"

U.S. ARMY ENGINEER DISTRICT, BUFFALO

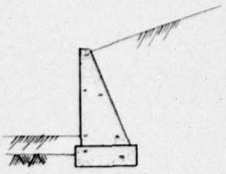
PLATE L5



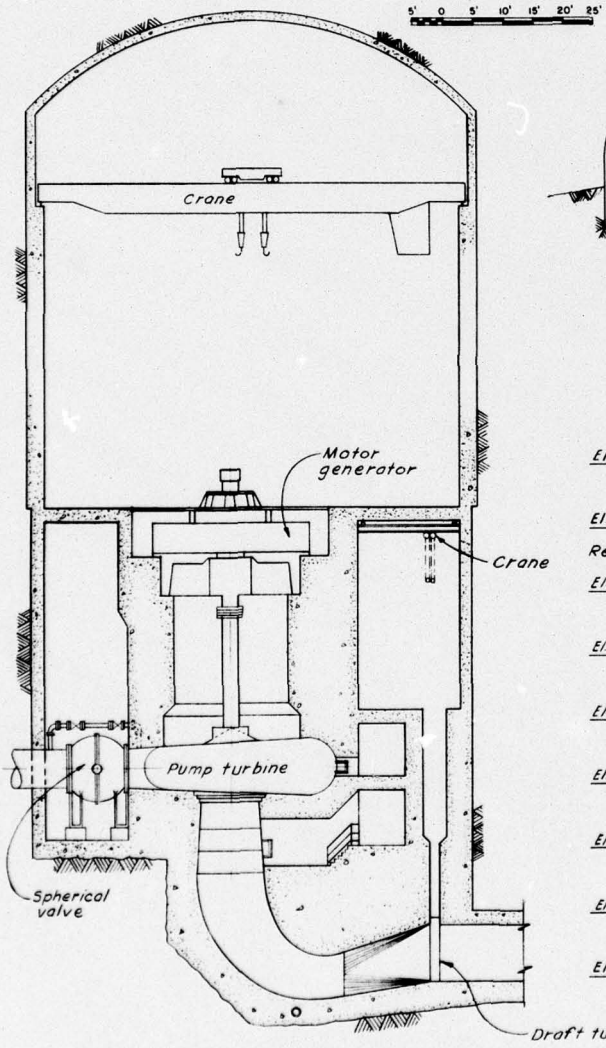
POWERHOUSE FLOOR PLAN

SCALE IN FEET

5' 0 5' 10' 15' 20' 25'



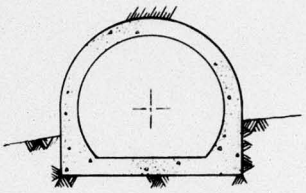
TYPICAL WING WALL SECTION



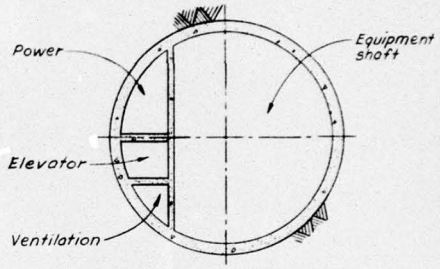
SECTION THRU POWERHOUSE-PLAN C

SCALE IN FEET

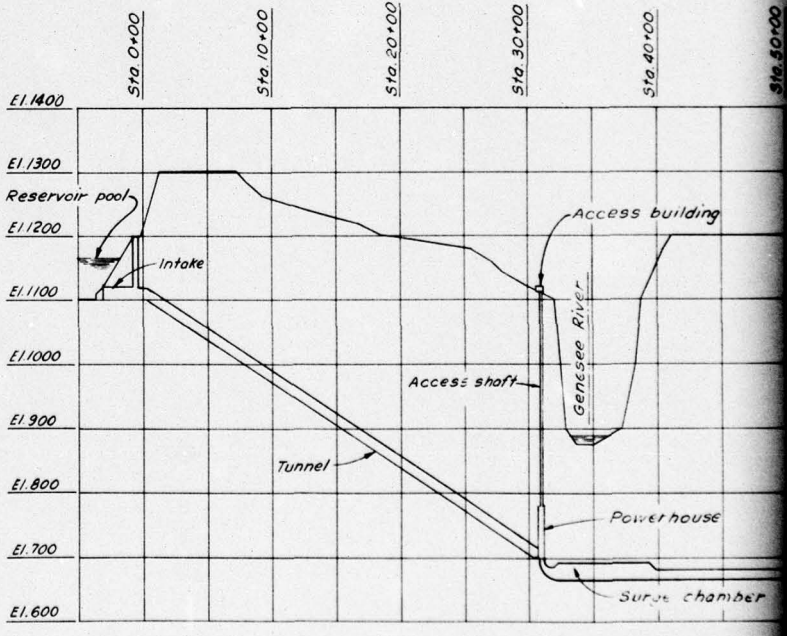
5' 0 5' 10' 15' 20' 25'



CONDUIT SECTION



SECTION THRU ACCESS SHAFT



TUNNEL PROFILE

SCALE IN FEET

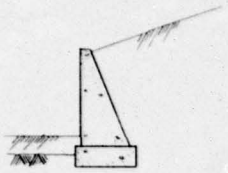
HORIZONTAL

500' 0 500'

VERTICAL

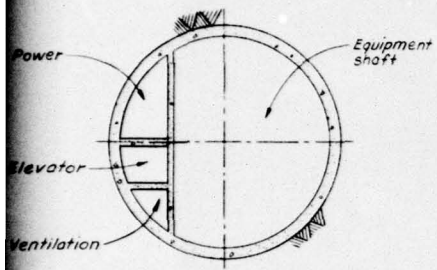
100' 0 100'



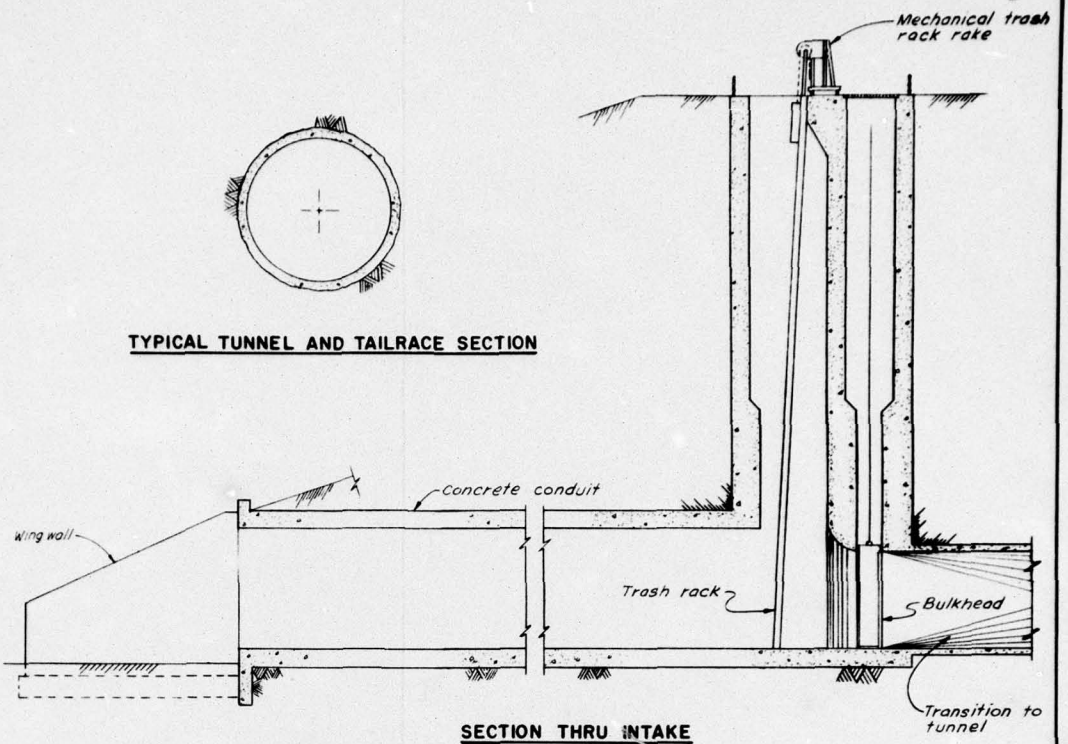


TYPICAL WING WALL SECTION

TYPICAL TUNNEL AND TAILRACE SECTION



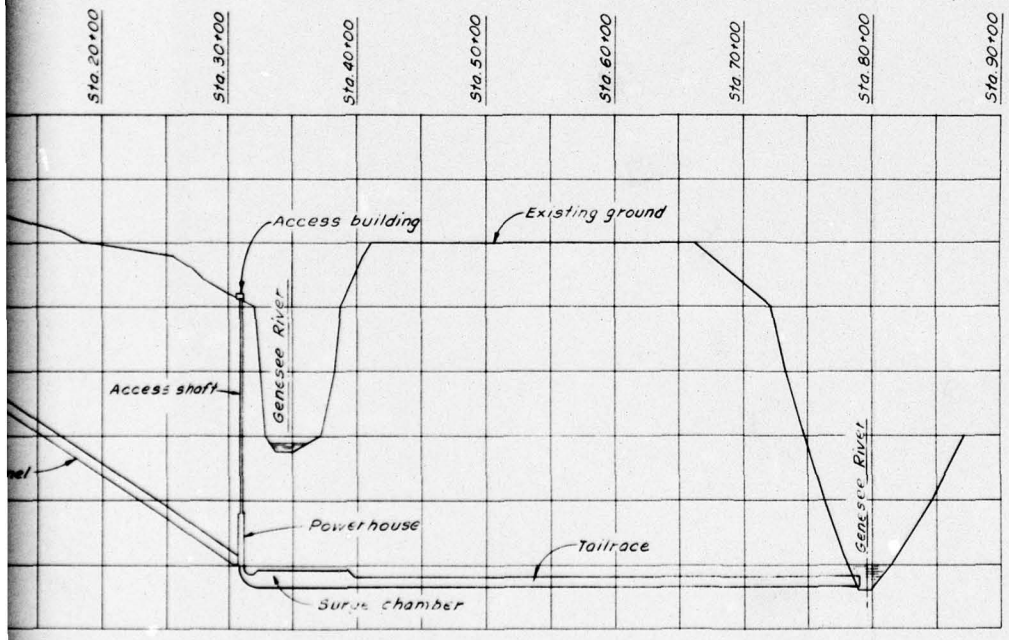
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TUNNEL PROFILE

SCALE IN FEET

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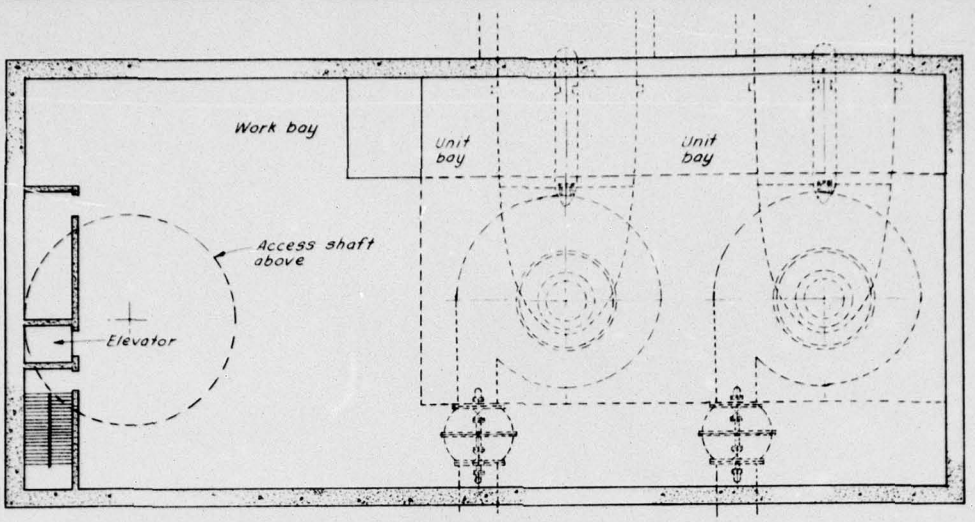
GENESEE RIVER BASIN
COMPREHENSIVE STUDY
NEW YORK AND PENNSYLVANIA

POWER DETAILS

PLANS "A", "B" AND "C"

U.S. ARMY ENGINEER DISTRICT, BUFFALO

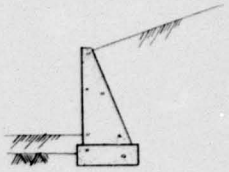
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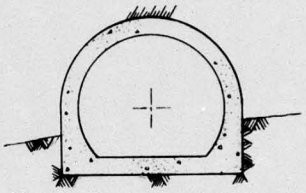
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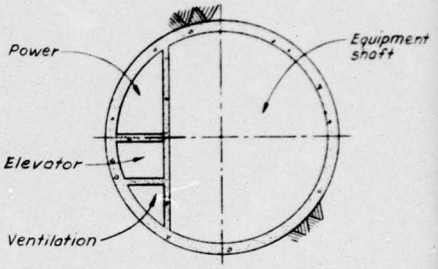
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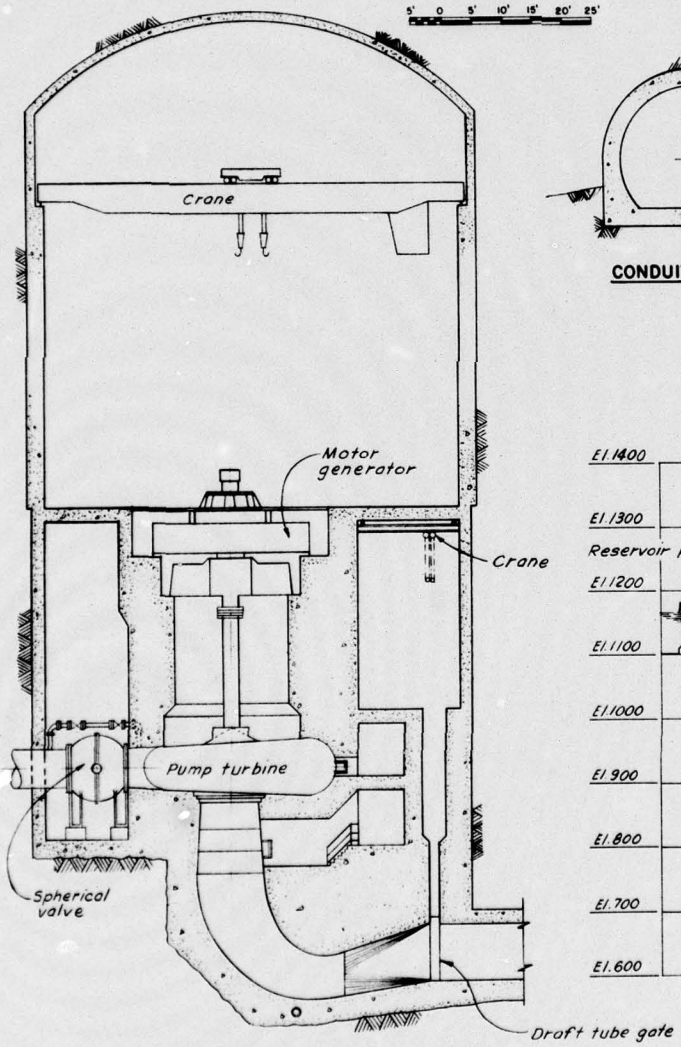
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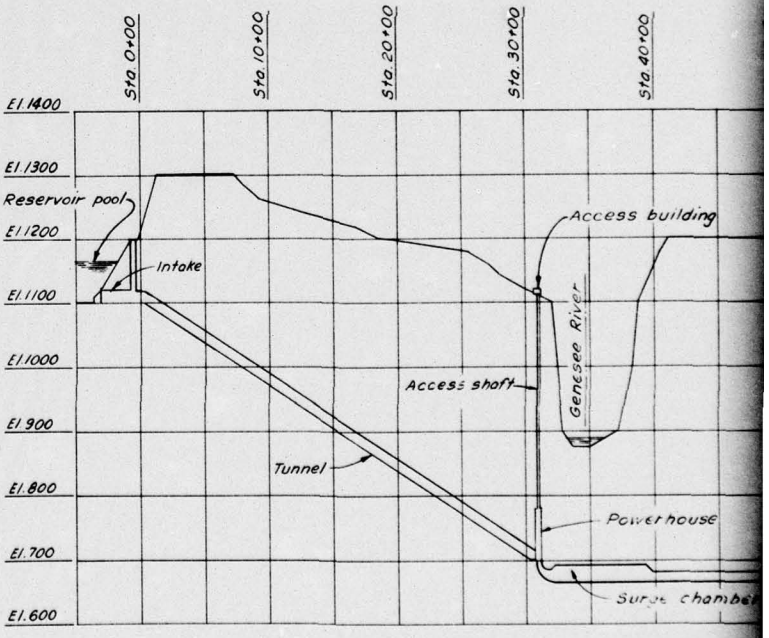
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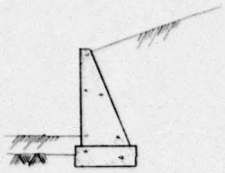
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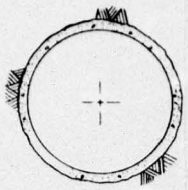
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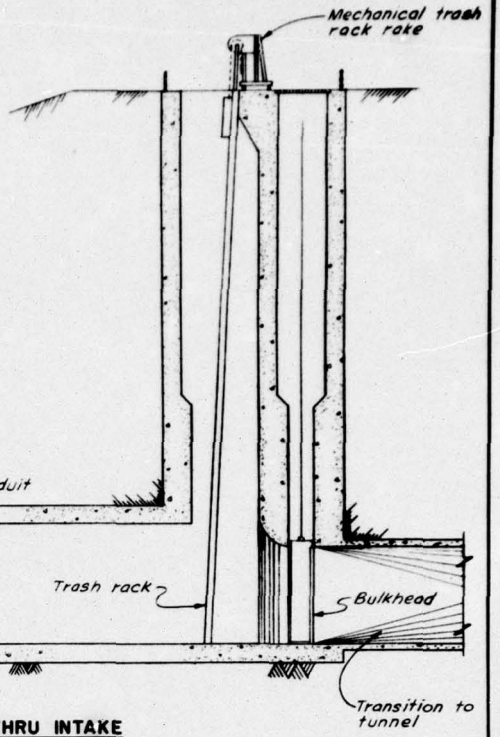
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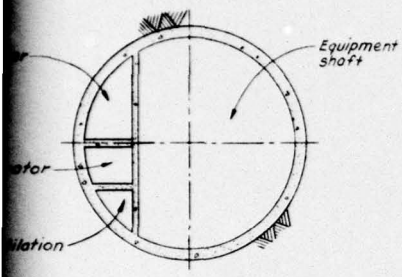
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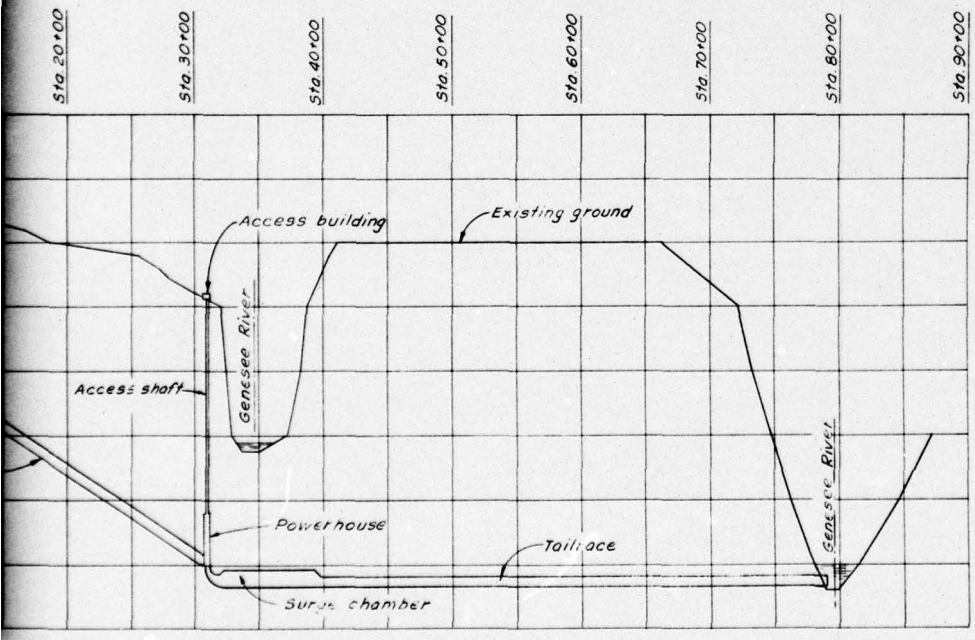
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TUNNEL PROFILE

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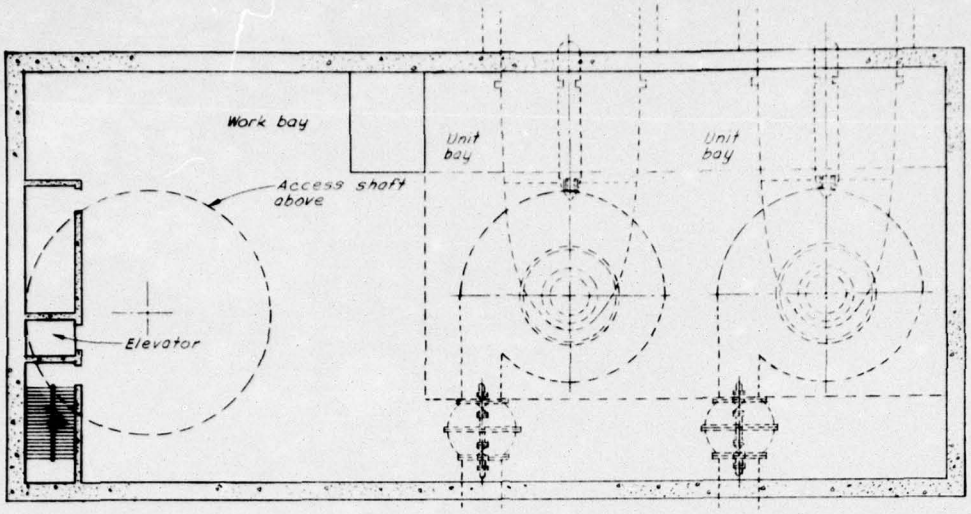
GENESEE RIVER BASIN
COMPREHENSIVE STUDY
NEW YORK AND PENNSYLVANIA

POWER DETAILS

PLANS "A", "B" AND "C"

U.S. ARMY ENGINEER DISTRICT, BUFFALO

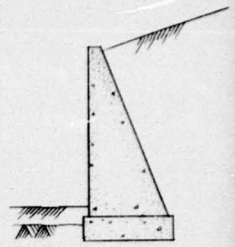
PLATE L6



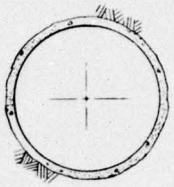
POWERHOUSE FLOOR PLAN

SCALE IN FEET

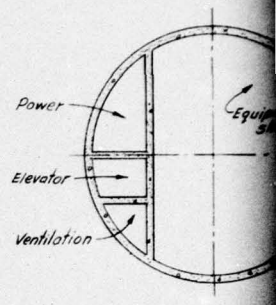
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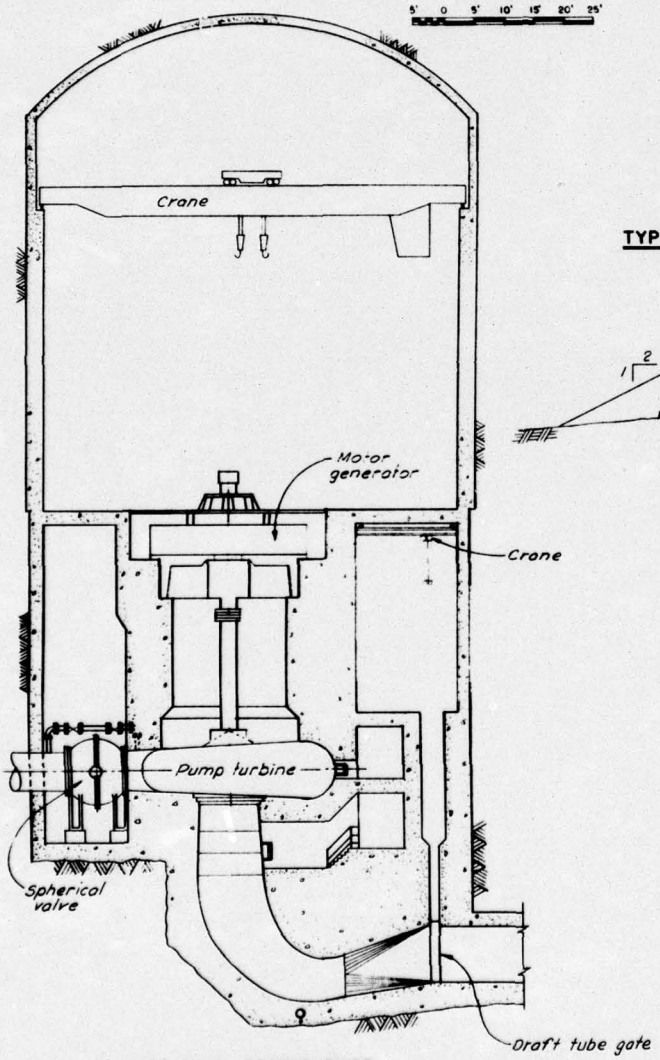
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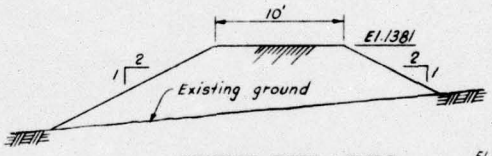
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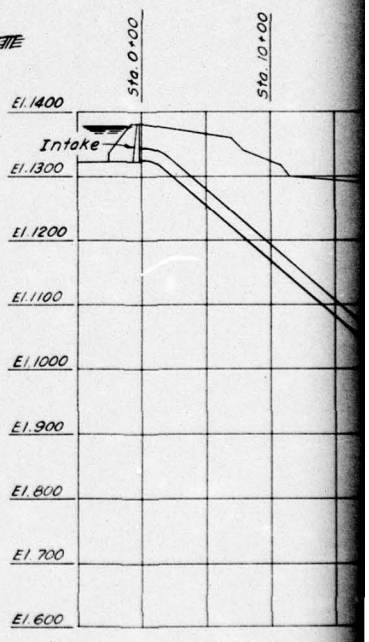
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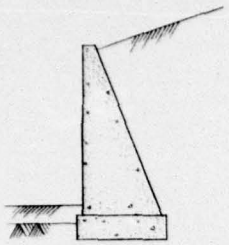
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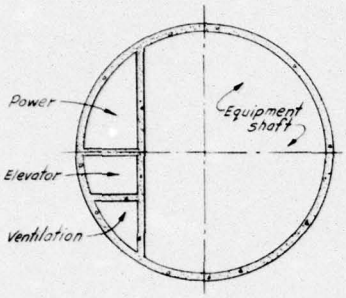


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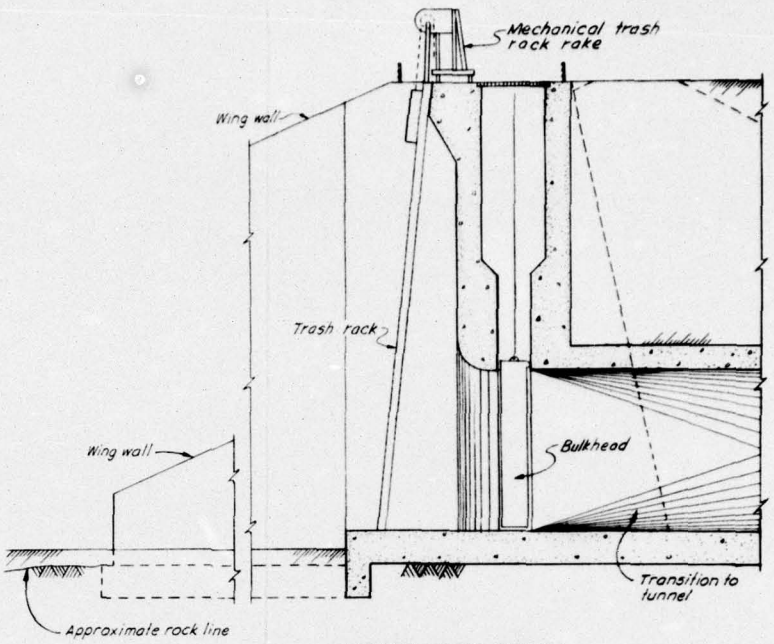




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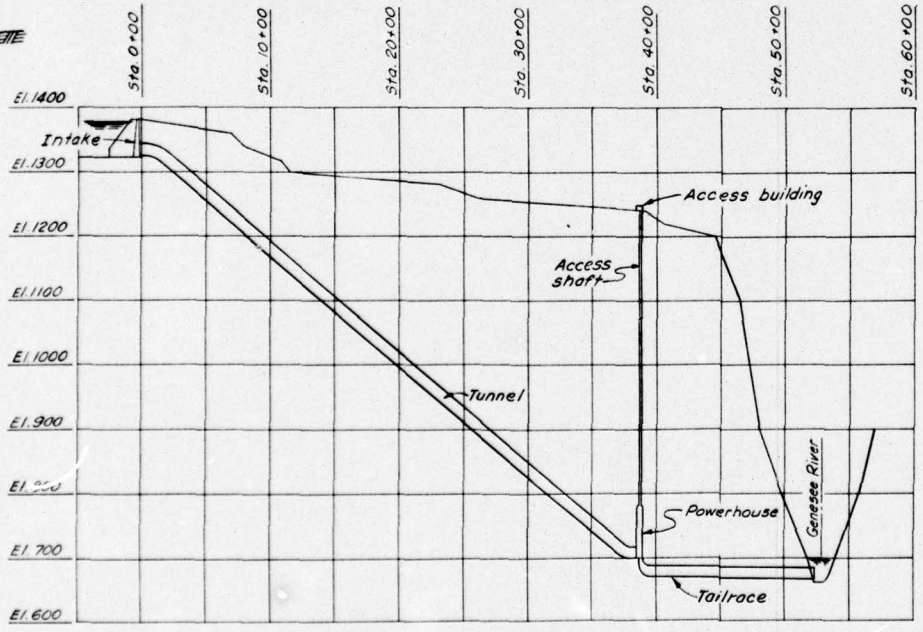
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SECTION THRU INTAKE

SCALE IN FEET

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TUNNEL PROFILE

SCALE IN FEET

HORIZONTAL

500' 0 500' 1000'

VERTICAL

100' 0 100' 200'

GENESEE RIVER BASIN
COMPREHENSIVE STUDY
NEW YORK AND PENNSYLVANIA

POWER DETAILS

PLAN "D"

U.S. ARMY ENGINEER DISTRICT, BUFFALO

PLATE L7

SUPPLEMENT A FOR APPENDIX L - Electric Power

GENESEE RIVER BASIN COMPREHENSIVE STUDY

POWER REQUIREMENTS AND SUPPLY

Prepared by the
Federal Power Commission
New York Regional Office

Revised July 1969

SUPPLEMENT A FOR APPENDIX L - ELECTRIC POWER
of
GENESEE RIVER BASIN COMPREHENSIVE STUDY

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2	Distribution of Total Energy Requirements by Class of Service	L4A
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EXHIBITS

Exhibit No.	
1	Power Requirements of Utility Market Area

Genesee River Basin Study

Power Requirements and Supply

A. General

The Genesee River Basin covers a land area of some 2,479 square miles, of which more than 96 percent is located in the State of New York and the remainder in Pennsylvania. The area extends from Lake Ontario in Northern New York to the headwaters of the Genesee River in Potter County, Pennsylvania. The estimated population of the basin at the end of 1963 was 750,000, with nearly one-half of the total in the City of Rochester.

Electric service in the basin is provided by three privately-owned electric utilities, seven municipal systems, and one rural electric cooperative, as listed in the following:

Privately-owned Utilities

Rochester Gas and Electric Corp. - New York
Niagara Mohawk Power Corp. - New York
New York State Electric & Gas Corp. - New York

Municipal Systems

Village of Andover Electric Department - New York
Village of Angelica Electric Light and Power Board - New York
Village of Bergen Electric Department - New York
Village of Castile Electric Utility - New York
Village of Churchville Electric Department - New York
Village of Silver Springs Electric Department - New York
Village of Wellsville Water and Light Department - New York

Rural Electric Cooperative

Tri-County Rural Electric Cooperative, Inc.,
(Pennsylvania)

Rochester Gas and Electric Corporation provided more than 95 percent of the basin's energy requirements in 1968. The Power Authority of the State of New York supplies at wholesale all the power requirements of the area's municipal systems. This service is carried out by wheeling arrangements with the large private

utilities. The requirements of the Tri-County Rural Electric Cooperative, Inc. (Pa), are provided by the Pennsylvania Electric Company and the Keystone Division of West Penn Power Company. The three largest privately-owned utilities operating in Up-state New York and the Power Authority are interconnected at numerous points by high voltage and high capacity ties with each other and with other utilities in New York to form a large statewide power pool. The high degree of coordination within this pool provides significant advantages to its members. Even greater benefits will accrue in the future through joint planning and scheduling of capacity additions and equipment maintenance, economy loading, use of large units and of specialized generating capacity for specific segments of load and many other mutually advantageous activities associated with large-scale power pooling. The combined load of the area served by this pool (15,500 Mw in 1968) offers an adequate market for the output of any conventional or pumped-storage hydro-electric power project in the Genesee River Basin that may be found economically feasible for development.

B. Past and Future Power Requirements

The electric power requirements of the population and industries in the Genesee River Basin have grown steadily over the years as this form of energy was put to use in ever-widening fields of human endeavor. In 1968 the area's requirements exceeded 3.8 billion kilowatt-hours with an associated peak demand of 716 Mw. Since 1940 electric energy utilization in this area nearly doubled in each decade. This is attributed to technological progress, rising standards of living, and expanding per capita income. In the next 15-20 years, nearly the same rate of growth can be expected. Future loads for the immediate future have been developed from estimates of the requirements of the several principal classes of electric service. For more distant periods such as 1990-2020, the estimates have been prepared by long term projections.

Table 1 shows the past and estimated future electric power requirements in the Genesee River Basin over the period 1950-2020, inclusive. Estimated future peak demands of the New York Power Pool are shown for comparison purposes. Exhibit 1 shows these data in graphic form.

Table 1

Genesee River Basin Study

Past and Estimated Future Power Requirements 1/

Year	Genesee Basin			N. Y. Power Pool
	Energy Requirements	Peak Demand	Load Factor	Peak Demand
	Million Kwh	Thousand Kw	%	Thousand Kw
1950	1,051	227	52.9	6,300
1960	1,999	428	53.2	10,100
1968	3,780	716	60.0	15,500
1980	6,800	1,300	60.5	28,500
1990	11,000	2,060	60.8	48,100
2000	18,000	3,370	61.0	82,200
2010	29,300	5,440	61.5	136,800
2020	47,800	8,800	62.0	227,000

1/ 1950-1968 Actual.

Table 2 shows the distribution of the total requirements among the principal classes of service in the 1960-1980 period. An important feature of this distribution is the relatively high proportion of energy sales to rural, residential and commercial users as compared with sales to industries.

Table 2

Genesee River Basin Study

Distribution of Total Energy Requirements by Class of Service
Million Kwh

1960-1968 Actual; 1980 Estimated

Class of Service	Energy Requirements by Years		
	1960	1968	1980
Rural and Residential	636	1,118	2,490
Commercial	459	908	1,540
Industrial	539	1,114	1,600
All Other	182	340	550
Total Deliveries	1,816	3,480	6,180
Losses and Unaccounted for	183	300	620
Total Energy Requirements	1,999	3,780	6,800

C. Present and Required Future Power Supply

The power required by electric energy consumers in the Genesee River Basin comes from sources located within as well as outside this area. As stated previously, the Power Authority of the State of New York, with power plants at Niagara Falls and Massena, New York, provides the municipal systems as well as the private utilities with large amounts of power. Similarly, the requirements of the Tri-County Rural Electric Cooperative are provided by distant power plants located outside the area. On the other hand, the portion of the market served by Rochester Gas and Electric Corporation obtains its supply from the utility's four steam-electric and six hydroelectric stations located in the area. Together, these plants, had an

installed capacity of 519,190 Kw at the end of 1968. The utility also obtains a firm power supply of 185,000 Kw by a long-term contract from the Power Authority of the State of New York. Plate L1 shows the principal electric generating and transmission facilities in the Genesee River Basin. The Village of Wellsville Water and Light Department's small steam-electric plant with an installed capacity of 1,500 kilowatts was retired from service in January 1966. Table 3 lists the various generating facilities owned and operated by electric utilities in the area under consideration.

Table 3

Genesee River Basin Study

Installed and Dependable Generating Capacity in the Basin as of December 31, 1968

Company Name	Plant Name	Location: Town	Location: River	Type	Capacity - Kilowatts: Installed	Capacity - Kilowatts: Dependable
Rochester Gas & Electric Corp.	Station # 2	Rochester, N.Y.	Genesee	Hydro	6,500)	52,600
	# 5	Rochester, N.Y.	Genesee	Hydro	38,250)	
	# 26	Rochester, N.Y.	Genesee	Hydro	3,000)	
	#160	Mt. Morris, N.Y.	Genesee	Hydro	340)	500
	#170	Wiscoy, N.Y.	Wiscoy Cr.	Hydro	1,080)	
	#172	Mills Mills, N.Y.	Wiscoy Cr.	Hydro	220)	
Total Hydro					49,390	53,100
Rochester Gas & Electric Corp.	Russell # 7	Greece, N.Y.	Lake Ontario	Steam	252,600	271,500 1/
	Beebee # 3	Rochester, N.Y.	Genesee	Steam	206,200	189,500 1/
	Station # 8	Rochester, N.Y.	-	Steam	8,000)	6,000
	Station # 9	Rochester, N.Y.	-	Steam	3,000)	
Wellsville Water & Light Dept.	Wellsville	Wellsville N.Y.	Genesee	Steam	-	- 2/
Total Steam					469,800	467,000
Total All Plants					519,190	520,100

1/ Net capability at time of winter peak.
2/ Retired 1/1/66. Installed capacity was 1,500 Kw.

D. Required Capacity Additions for 1980 and 1990 Loads

Estimated growth in power requirements, when compared with existing capacity, expected retirements of capacity, scheduled additions and necessary reserves will provide an indication of future capacity additions needed for power supply in the Basin. Changes in the technology and economics of energy production will continue to occur and estimates must necessarily be made for planning purposes.

Table 4 shows the derivation of the amounts of new capacity additions which the expanding power market of the Basin will require by 1980 and 1990, 573 Mw and 1583 Mw, respectively. In deriving the above table, retirement of thermal units were taken at 40 years and reserve requirements were estimated at 20%.

Table 4

Genesee River Basin Study

Load and Capacity Summary 1980, 1990

Items	Units	1980	1990
Required Generator Capacity			
1. Peak Demand	Mw	1,300	2,060
2. Required Reserve (Margin)	%	20	20
3. Required Reserves	Mw	260	420
4. Total Required Capacity (1 + 3)	Mw	1,560	2,480
Existing Dependable Capacity and Retirements			
5. Fuel Electric 1968	Mw	467	467
6. Scheduled Additions to Indicated Year	Mw	559	559
7. Retirements to Indicated Year	Mw	92	182
8. Hydroelectric 1968	Mw	53	53
9. Net Generating Capacity Available (5+6-7+8)	Mw	987	897
Additional Capacity Required			
10. Required Additions (4-9)	Mw	573	1,583

Among the capacity additions scheduled for installation before 1970 is the Ginna Nuclear Unit (517-Mw) to be built by the Rochester Gas and Electric on Lake Ontario in the vicinity of Rochester, New York. Some of the output of this station will be made available to the interconnected utilities of the New York State Power Pool.

"Electric Power in the Northeast," a report prepared by the Northeast Regional Advisory Committee for the Federal Power Commission's National Power Survey, found that capacity additions scheduled by New York utilities for installation in the Genesee Basin before 1970 would provide sufficient capacity for the expected load in that year. For later years up through 1990, the program would be tentative and subject to change. It is expected however, that units #2 and possibly #3 and #4, would be added at or near the R. E. Ginna site. Since unit sizes are increasing, and good water sites are at a premium, the location would be utilized to its ultimate capacity.

E. Hydroelectric Power Values

The economic feasibility of any potential hydropower project is usually determined from a comparison of the annual cost and annual value of its output. Annual costs include fixed charges on investment, production expenses, and administrative and general expenses. Annual value is measured by the cost of an equivalent supply of power from an alternative and equally dependable source. Values shown herein are at the high-tension side of the step-up substation of the hydro project expressed in terms of two components: (1) a capacity value in dollars per kilowatt-year of dependable capacity; and (2) an energy value in mills per kilowatt-hour of the project's average annual output.

An alternative to a proposed hydroelectric project can be almost any of the various types of power plants built and operated at the present time by the utility industry. Included among them are conventional and peaking steam-electric stations, nuclear plants, pumped-storage hydropower developments, jet engine gas turbine and diesel-driven electric power plants. However, the appropriate alternative to be used should be of the type most likely to be built in the absence of the proposed project. Furthermore, it should be of the type for which an adequate record of performance, costs and physical characteristics are readily available. Various adjustments are applied to the power values to allow for inherent physical and operating differences between the proposed hydro project and its alternative.

For the several potential projects examined in the Genesee River Basin Survey, the alternative was taken to be a conventional steam-electric station located in the vicinity of Rochester, New York, with generating units of 400 to 500 megawatts each costing $130 per kilowatt (January 1, 1966 price levels). Annual costs would depend primarily on the financing method used for obtaining the necessary funds for the alternative station and its associated facilities and for the hydro transmission lines.

Based on the above considerations, the at-site capacity and energy values suitable for economic analyses of potential hydropower developments in the Genesee River Basin, based on private and federal financing, are as follows:

	Capacity Value $/Kw/Yr	Energy Value Mills/Kwh
Private Financing	19.00	2.3
Federal Financing	10.00	2.3

Cost of pumping energy for use in economic analysis of potential pumped-storage projects is estimated at 3.0 mills per kilowatt-hour.

F. Water Requirements for Thermal Generation

The water resources of the Genesee River are used for many purposes vital in the economy of the area. Included among them is steam-condensing at several steam-electric stations located on the Genesee River. The dependable capacity of the largest of these plants, the Beebee #3 (206,200 kilowatts) is reduced for load carrying purposes during the river's high ambient temperature and low flow months of the year. The large Russell #7 station built in 1949-1957 with an installed capacity of 252,600 Kw obtains its cooling water from Lake Ontario and the same will be true of the nuclear power station scheduled for completion in 1969. This large body of water is also likely to be the source of unlimited cooling water for other thermal capacity additions, that will be built to serve this market in the future.

The amounts and sources of future cooling water supplies depend upon numerous factors, including importantly the impact of the proposed water quality standards on such water use. Some of these factors have not been fully evaluated.

The Federal Power Commission staff has made estimates of possible future cooling water requirements which are published in the Water

Resources Council's First National Assessment (1968). The studies were based on the following estimated condenser requirements and consumptive uses, applicable to fossil-fueled steam-electric plants, with somewhat greater (30 to 50 percent) requirements estimated for nuclear-fueled plants:

Year	Condenser Water (1) Requirement	Consumptive Use		
		Once Through	Cooling Ponds	Cooling Towers
		(Gallons Per Kilowatt-hour)		
1965	40	0.3	0.4	0.5
1980	35	0.2	0.3	0.4
2000	30	0.15	0.25	0.35

(1) Based on temperature rise of 15°F.

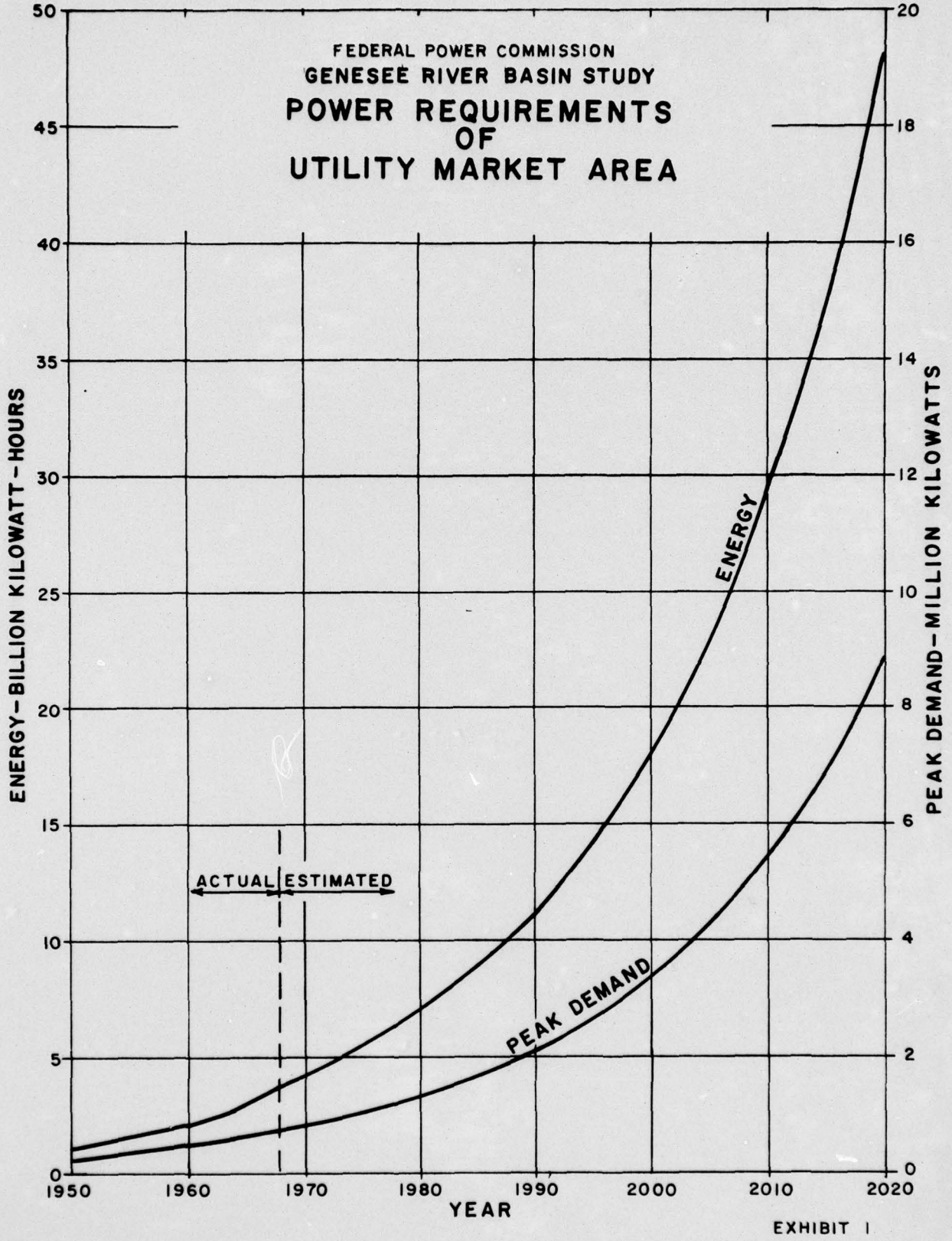
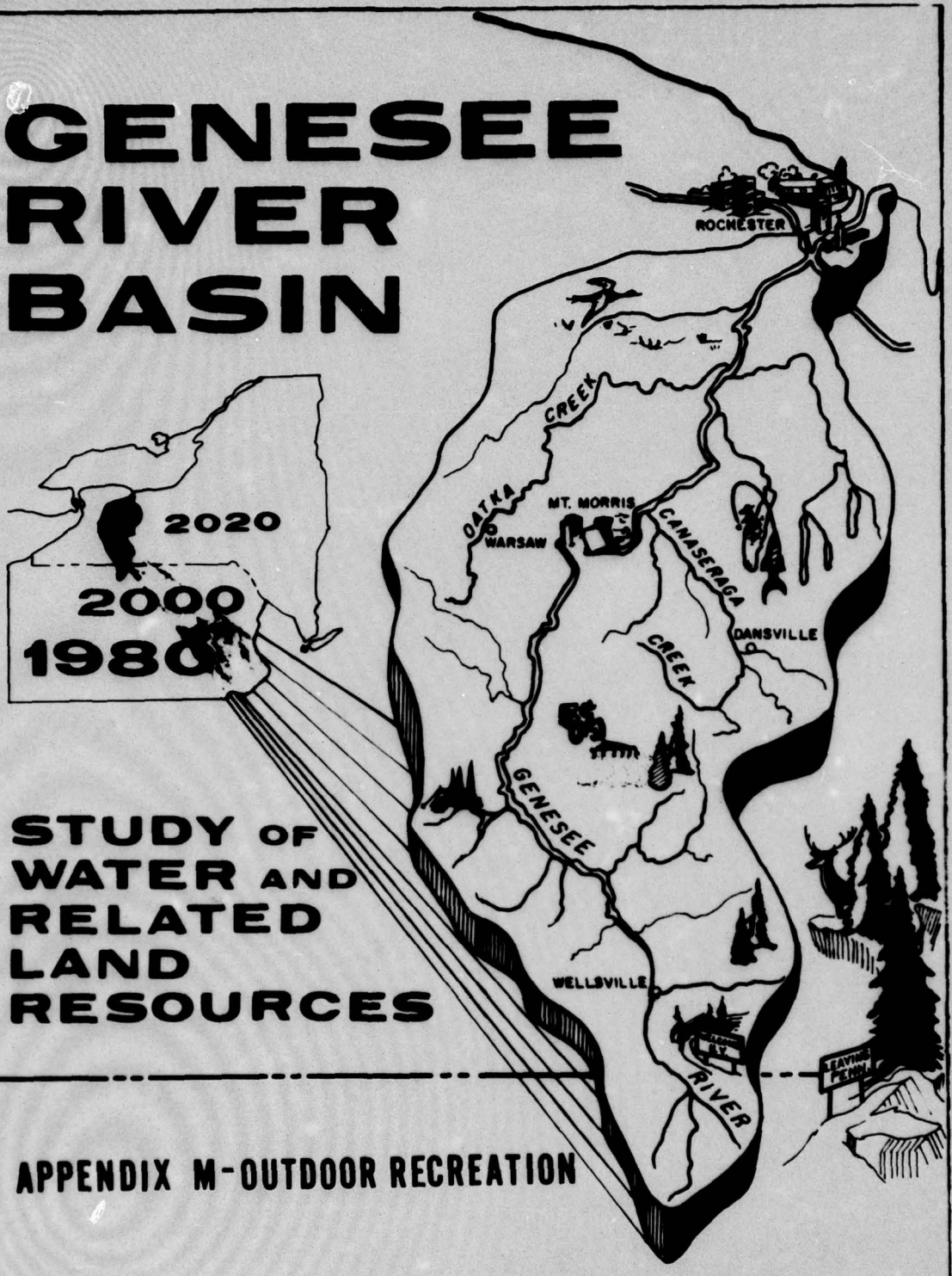

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GENESEE RIVER BASIN STUDY
POWER REQUIREMENTS
OF
UTILITY MARKET AREA
ENERGY-BILLION KILOWATT-HOURS
PEAK DEMAND-MILLION KILOWATTS
ENERGY
PEAK DEMAND
ACTUAL
ESTIMATED
YEAR
1950
1960
1970
1980
1990
2000
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2020
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5
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35
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18
20

EXHIBIT 1

GENESEE RIVER BASIN



STUDY OF WATER AND RELATED LAND RESOURCES

APPENDIX M - OUTDOOR RECREATION

GENESEE RIVER BASIN

COMPREHENSIVE

STUDY OF

WATER AND RELATED LAND RESOURCES

Appendix M

Outdoor Recreation

June 1967

GENESEE RIVER BASIN STUDY

Appendix M

Report of Task Group No. 8--Recreation

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GENESEE RIVER BASIN STUDY

Appendix M

Report of Task Group No. 8--Recreation

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FOREWORD

Task Group Members

This report has been prepared through the cooperation of members of the following agencies:

New York State Conservation Department (Chairman)
U. S. Department of the Interior, Bureau of Outdoor Recreation
U. S. Department of the Interior, National Park Service
U. S. Department of the Interior, Fish and Wildlife Service
U. S. Department of Agriculture, Soil Conservation Service
U. S. Department of Agriculture, Forest Service
U. S. Department of Agriculture, Economic Research Service
U. S. Department of the Army, Corps of Engineers
U. S. Federal Power Commission
State of Pennsylvania, Department of Forests and Waters

The cooperation of other agencies is also acknowledged.

At the beginning of the study it was assumed that this Task Group would prepare a "single purpose" study of recreational values of all proposed impoundments within the Basin. However, as the study progressed it became apparent that limiting factors arising from studies by other Task Groups and by the Corps of Engineers rapidly limited the practical feasibility of most projects for a recreational "single purpose". Time limitations were also factors.

Accordingly, this report, while presenting the broad picture of supply, demand, and needs, and outlining a large number of areas that may, in the future, be profitably studied, examines in some detail only the "Portage" project, which appears to be the only major impoundment having multi-purpose possibilities, including recreation.

Task Group No. 8 Report in Two Parts

The U. S. Department of the Interior, Bureau of Outdoor Recreation prepared, under date of June 1967, a "Comprehensive Study of Outdoor Recreation, Genesee River Basin" which has been compiled with the co-operation of Task Group No. 8. Methodology for determination and projection of Demand, Supply, and Needs was developed by B.O.R. using their background of experience, statistical reports issued by the Outdoor Recreation Resources Review Commission (ORRRC) 1960-61 National Recreation Survey, and statistical information on facilities within the considered Region furnished by members of Task Group No. 8. The "Outdoor Recreation Plan", Tables 1 and 3, evaluating the recreational potential of proposed Corps of Engineers impoundments and proposed Soil Conservation Service impoundments, reflect findings of Task Group No. 8 field investigations and decisions at meetings of the Group. The B.O.R. data and its recommendations were approved by Task Group No. 8 to be incorporated in the Group report as Part 2.

While Part 2 (B.O.R.) examines, and presents in some detail statistics concerning the "key" activities of Swimming, Boating, Camping, and Picnicking, it should be understood that, in the wide spectrum of recreational activities, these are not the four top-ranking activities. In April 1967 the Department of the Interior, Bureau of Outdoor Recreation (B.O.R.) published "Outdoor Recreation Trends", analyzing participation in 16 major nation-wide recreational activities, compared with participation in those 16 activities estimated by the Outdoor Recreation Resources Review Commission (ORRRC) in 1960. B.O.R. found that participation in

1965, in the 16, was 6,476,000,000 occasions, a 51% increase over the 4,282,000,000 occasions found by ORRRC in 1960. Following is data from the 1967 BOR publication, listing the activities in order of their rank of occasions of participation.

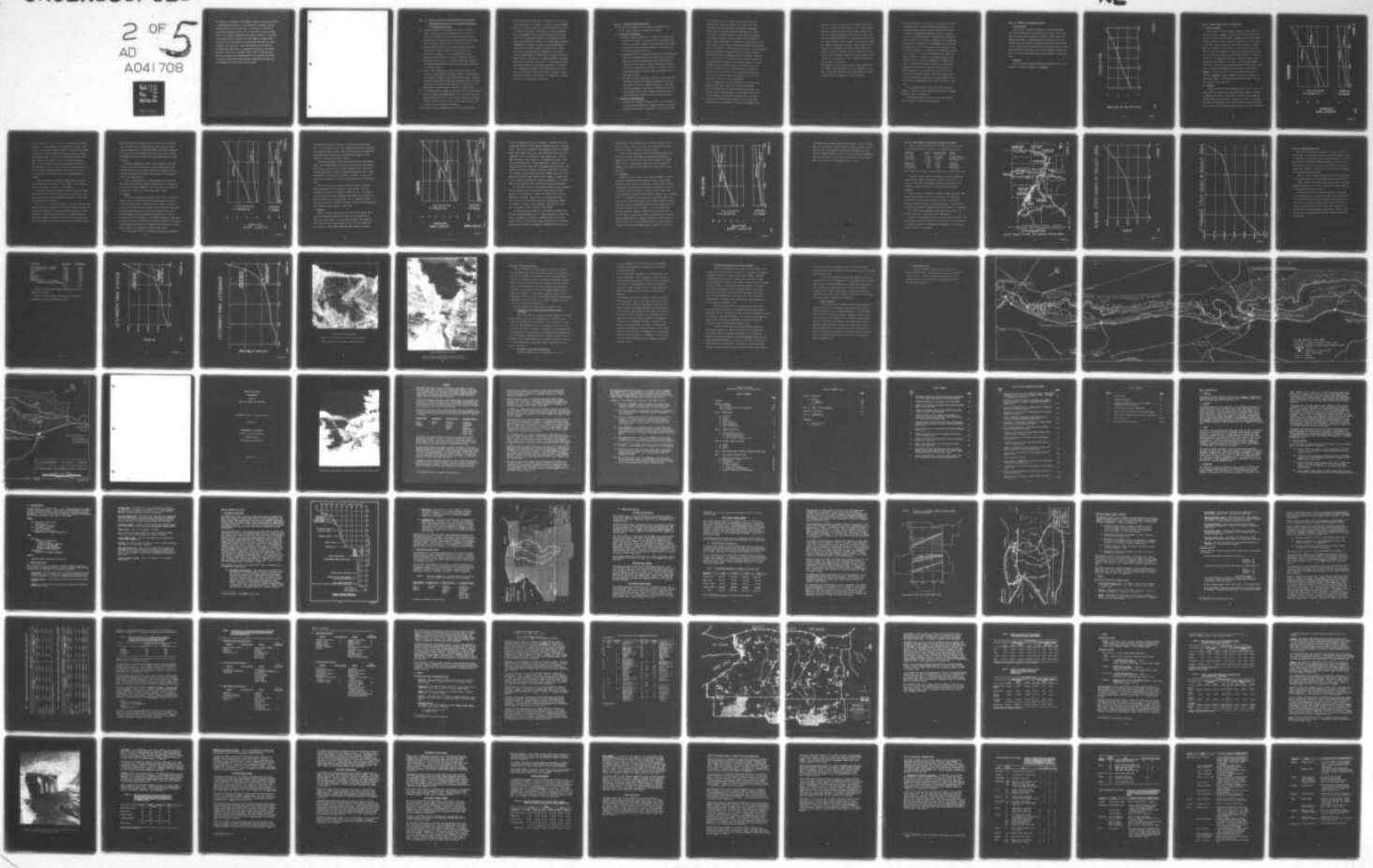
Rank	Activity	Percent Increase 1960 to 1965	Projected Increase 1965 to 1980	Projected Increase 1965 to 2000
1	Walking for pleasure	+ 82%	+ 49%	+ 151%
2	Swimming	+ 44	+ 72	+ 207
3	Driving for pleasure	+ 8	+ 51	+ 128
4	Playing outdoor games or sports	+ 96	+ 72	+ 216
5	Bicycling	+ 104	+ 32	+ 84
6	Sightseeing	+ 59	+ 54	+ 156
7	Picnicking	+ 63	+ 48	+ 127
8	Fishing	+ 24	+ 31	+ 78
9	Attending outdoor sports events	+ 43	+ 43	+ 117
10	Boating (other than canoeing and sailing)	+ 38	+ 76	+ 215
11	Nature walks	+ 19	+ 48	+ 134
12	Camping	+ 62	+ 78	+ 238
13	Horseback riding	+ 40	+ 44	+ 132
14	Water skiing	+ 43	+ 121	+ 363
15	Hiking	+ 47	+ 78	+ 218
16	Attending outdoor concerts and plays	+ 74	+ 70	+ 206
	6,476,000,000 occasions in 1965	+ 51	+ 56	+ 160

It is interesting to note that "Driving for Pleasure", that was found to be No. 1 by ORRRC in 1960 was dropped to No. 3 by B.O.R. in 1967. In releasing on March 1, 1967 a study, "A Proposed Program for Scenic Roads and Parkways" prepared by the Department of Commerce in June 1966, the statements are made "Driving

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for pleasure is the Nation's most important outdoor recreational activity," ...."More Americans engage in it more often than in swimming, boating, hunting, fishing, or any other sports. It accounts for 42 percent of all outdoor recreation," and "One out of three vehicle miles of highway travel is for social, recreational, and vacation purposes." In any case, it is apparent that the objective of a high percent of highway travel is related to the recreational and vacation objectives which are being studied in this report, and indicate the mobility of the population in seeking those objectives. It emphasizes the importance of parkways and scenic drives in the recreation complex of the 18 counties being studied, and supports the recommendations of the committee with respect to a limited access scenic road adjacent to Letchworth State Park and the "Portage" project as detailed in this report.

Sec. 1-A Conditions Related to Mass Recreation and Scenic Beauty Established by Task Group No. 8 for Corps of Engineers or Soil Conservation Projects.

(1) Only areas suitable for development for the use of a large number of people and multiple activities will be chosen for review by the Committee. Those having predominantly fish and game interests or that materially interfere with those interests will be referred to Task Group No. 9, Fish and Wildlife.

(2) Any major reservoir must have supporting land area around the proposed water areas of sufficient size to develop its potential for recreation. It is recommended that wherever practicable complete control of access be obtained around any considered reservoir site. The standard Federal 300' clearance is considered insufficient for protection and maximum utilization of a recreation area.

(3) A water level fluctuation of 5 feet or less between May 1 and November 1, under operating conditions, except in flood emergency, is considered essential for mass recreation development. Reservoir projects with greater fluctuation are considered suitable as supply reservoirs and for some boating, fishing and hunting, but not for establishment of major adjacent land-based recreation areas.

(4) Any planned reservoir upstream from Letchworth State Park should provide for a guaranteed minimum daylight flow of 225 c.f.s., and an average daily flow of 170 c.f.s., over the three falls in the Park. A flow of 225 c.f.s., from 7 a.m. to 11 p.m. and 60 c.f.s., from 11 p.m. to 7 a.m. will meet the criteria.

(5) Any water area to be maintained back of Mt. Morris Dam within

Letchworth State Park shall have a fluctuation of not more than 2 feet between May 1 and November 1, except in a flood emergency.

(6) The scenic beauty and aesthetics of Letchworth State Park are to be protected in any plan. Specifically, if a power generating plant is considered within the Letchworth Park area, the power plant shall be completely underground, and intakes and outlets shall be stone-faced and located to be as unobtrusive as possible. Transmission lines shall be carried in tunnels underground to points outside the Park's present or planned limits. Even at extra cost, construction shall be carried out in a manner to cause the least damage and disturbance to the trees, shrubs and natural values of the Park and to interfere as little as possible with the use of the Park by the public. It was pointed out that, while the New York State Conservation Department is represented on the Committee, no approval of any plan involving use of any part of the State Park lands has been given or implied. Formal approval of the State of New York will be required as a necessary preliminary to implementation of any plan.

Sec. 1-B Conclusions and Recommendations

(1) The Task Group approves the conclusions and recommendations stated in Part 2 (The B.O.R. comprehensive study).

(2) Supplementary Conclusions

a. Even with complete development of existing and presently programmed public parks to be acquired within or immediately contiguous to the Basin, analysis of needs indicates that a serious deficiency of public recreation supply will exist during the entire time period being studied.

b. Implementation of the recommended development of the recreational phase of the "Portage" project, as an addition to Letchworth State Park, will be a very important first priority step in bridging the "needs" gap, but other new major mass recreation projects must be advanced in the next 10 to 20 years if the increasing gap between recreational supply and demand is to be kept within bounds.

c. The radius in miles within which individuals seek to meet their recreational demands is constantly increasing, influenced by such factors as more cars, improved roads, more leisure time, increasing congestion, overloading of recreation areas in and near metropolitan areas, and constantly diminishing supply of lands suitable for recreation near the metropolitan areas.

(3) Supplementary Recommendations

a. Subject to the conditions detailed in Sec. 1-A of this Report, the Task Group recommends as of highest priority prompt implementation of the Corps of Engineers Plan C - Run #1-A for the

Portage Reservoir, to be operated for Power, Recreation, and Water Quality. This plan provides: (1) a fixed level reservoir back of Mt. Morris Dam which will enhance recreational values within the existing Letchworth State Park, (2) a reservoir back of the proposed Portage dam which, with the exception of the month of October, meets the condition that draw-down not exceed 5.0 feet between May 1 and November 1, (3) provision for flow of 225 c.f.s. over the falls at Letchworth State Park during daylight hours, as specified in the Task Group's "Conditions", (4) an underground pump-storage generating plant within State lands with portals at Mt. Morris reservoir and Portage reservoir at acceptable locations, and (5) enhanced flow in the main stream of the Genesee River which will provide waters necessary to correct water quality to desired standards from Mt. Morris dam north to the southerly limits of the City of Rochester. It is understood that this plan has a favorable ratio of benefits to cost. The Task Group finds that other plans and runs do not meet the Conditions established for Recreation and therefore are not recommended.

It is recommended that the operating agency for all recreational features be the State of New York, Conservation Department, Division of Parks, Genesee State Park Commission, and that it be operated under the same Policies, Rules and Regulations as Letchworth State Park, and treated as an integral part of that Park.

b. The Task Group is particularly impressed with the recreational possibilities of an impoundment on Black Creek in Allegany County

studied by the Corps of Engineers as the "Summit" project and by the Soil Conservation Service as "Site 7-2". This has about 1500 acres of State-owned reforestation land contiguous to it that, with adequate additional land acquisition to ridge lines around the considered impoundment, would provide fish and wildlife benefits as well as mass recreation opportunities for camping, boating, swimming and picnicking. Unfortunately, material benefits are not available from other potential uses and are limited to those from recreation and fish and wildlife. Nevertheless, this is an important potential resource that should be developed if at all possible. It is recommended that further study be given to this project.

c. With respect to other potential reservoir areas, upstream from the Portage project, studied by the Corps of Engineers, it appears to this Task Group that their primary purposes should be storage of water for purposes other than recreation.

d. Following publication of the Report on the presently authorized Comprehensive Study of Water and Related Land Resources it is recommended that an additional study be authorized and funded to formulate a comprehensive Recreation Plan for the Region within the 18 counties related to the Genesee Basin identified in Part 2 (B.O.R.) of this study. The purpose of the additional study would be to make specific recommendations as to additional recreation areas that should be acquired and developed to meet the needs established in this Report, and to establish a priority for such areas. It is further recommended that an ORRRC-type survey of Demand in the Region be undertaken to localize and bring up to date the nation-wide Demands of the ORRRC 1960-61 report. The Task Group suggests that there is a substantial acreage of State-owned lands within the Region acquired for multiple purposes or for reforestation, some of which, by acquisition of additional parcels, would have excellent mass recreation potential, particularly where water-oriented recreation could be provided either from natural or artificial water areas.

This proposed additional study should evaluate wildlife damages in the areas being considered and note that such damages should be subject to mitigation.

Agricultural damages that will occur should be balanced against projected economic and social gains.

Sec. 1-C Definition of Recreational Region

18 County Region

Task Group No. 8 approved the adoption of an 18 County Region (14 in New York State and 4 in Pennsylvania) for study. This is considered necessary since recreational facilities in the Genesee Basin receive heavy usage by residents of these 18 counties. It has been estimated that 75% of usage at Letchworth State Park (705,000 visitors in 1966) comes from this 18 county area and that equal numbers of these western New York visitors come from the Buffalo-Niagara metropolitan area as come from the Rochester metropolitan area which is within the Basin.

Population

Data on population growth statistically presented in Part 2, for emphasis is presented in graph form in Figure 1.

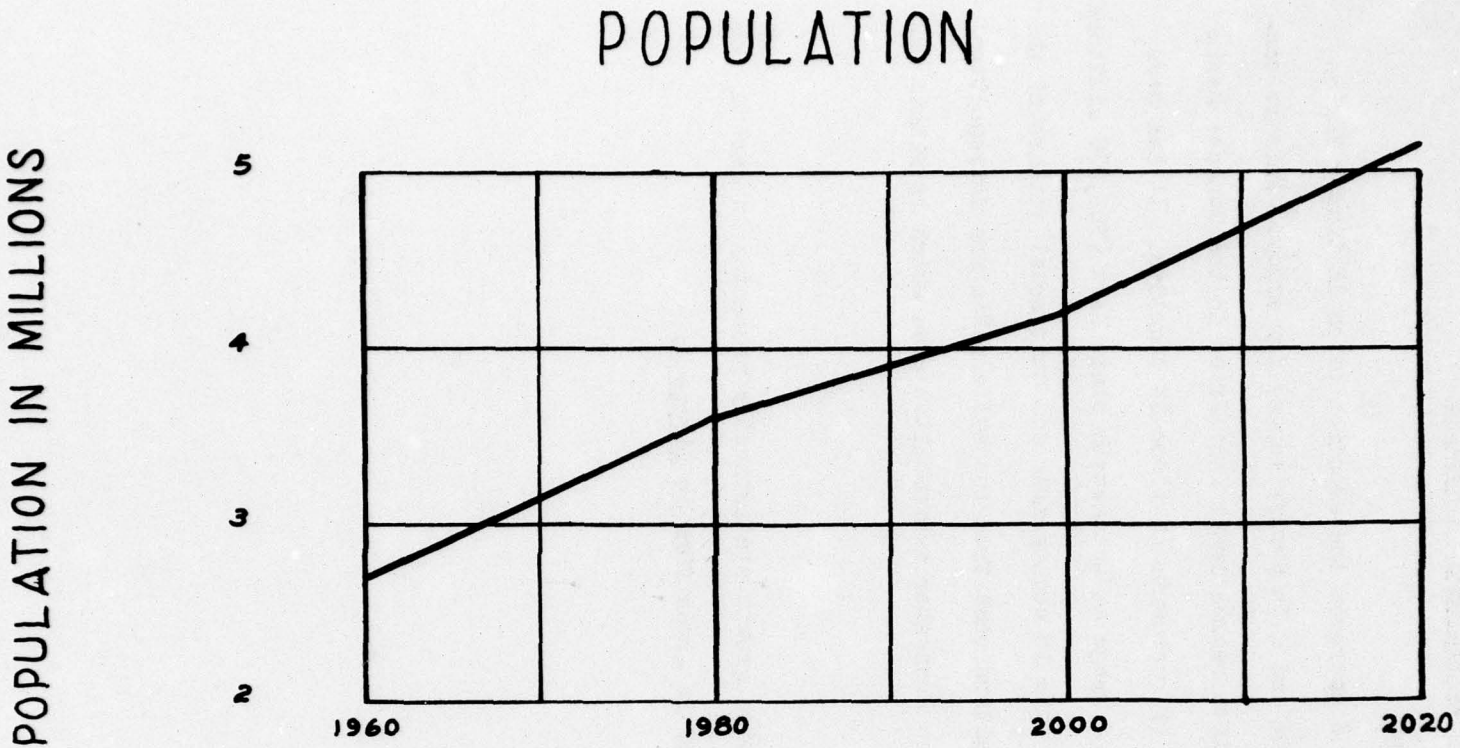


FIGURE 1

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FIGURE 1.

Sec. 1-D Supply, Demand, Need in Activity Days

(1) Supply and Demand

Tables in Part 2 (B.O.R.) present estimates of these factors for four key activities. Supply is projected from present inventory and estimates of programmed improvements. Demand is projected from ORRRC-1960-1961 National Recreation Survey as modified by B.O.R. observations in this area. The fact that, at present, Demand materially exceeds Supply is attested by the fact that, at Letchworth State Park recent major large-scale improvements in camping and swimming facilities were over-run and became turn-away operations within one year of opening to the public. This urgency and immediacy of Demand is apparent in all developments made available to the public in New York State parks in recent years. The principal unanswered question has been, "what is the ratio of existing and programmed recreation lands and developments (supply), to the public desire for and readiness to use specific facilities (demand)?" Figures 2-Swimming, 3-Boating, 4-Camping, and 5-Picnicking present graphs derived from estimates in Part 2 (B.O.R.) for each of four key activities.

(2) Swimming

Of the four key activities defined in Part 2 (B.O.R.), it is apparent that the disparity in activity days between supply and demand is greatest for swimming. The specter of pollution in our lakes and rivers accentuates this problem. Lake Erie, as a whole, is seriously polluted, and Lake Ontario, while less affected, has serious pollution near its major cities (all Lake Ontario beaches at the City of Rochester

FIGURE 2.

5/67

FIGURE 2

will be closed in 1967 for this reason). An associated difficulty arises due to an over-abundance of nutriments in our lakes. This results in a tremendous increase in algae and other plant and animal growths with, at times, beaches being clogged and made uninviting by decomposing algae. Sections of the Genesee River (except in its upper reaches) and sections of other streams in the Region, are polluted. New York State is vigorously attacking the problem and has provided a one billion dollar bond issue for that purpose. However, a realistic appraisal indicates that it may be 10 to 20 or more years before the pollution cycle in the Great Lakes can be reversed.

A boom in construction of private swimming pools is apparent, but this affects only a limited few in the higher economic strata and is only a "drop in the bucket" of mass demand.

Large public swim pools provide an excellent service (an Olympic size pool may provide 150,000 activity days in a season), but their very high cost prevents their widespread construction. Only a handful are available in the Region.

As we turn to the natural inland lakes we find that they have been preempted by private cottages, with only small frontages owned by public agencies, and virtually no undeveloped frontage available for future acquisition. Hemlock and Canadice Lakes, a few miles southeast of Rochester, are notable exceptions, but they and their watersheds are part of the Rochester water supply system, and all attempts to date to

make them available for multiple use of recreation and water supply have been stalled by the concept that mass public usage of a water supply watershed should be prohibited, rather than sensibly regulated. It is the opinion of the Committee that with proper water treatment these lakes and the areas around them could be made available to mass recreation.

Artificial impoundments, subject to the "Conditions" previously set forth, offer the best opportunity to meet swimming needs. The "Portage" project, in an area where pollution is negligible or can be controlled, would present excellent opportunities for development of several large swimming areas.

B.O.R., in their publication "Outdoor Recreation Trends" dated April 1967, report 44% more occasions of participation in swimming in 1965 than was reported by ORRRC for 1960. They project a further 65% increase 1965 to 1980, and a 207% increase 1965 to 2000.

(3) Boating

Of the four key activities described in Part 2 (B.O.R.), the second highest need is in boating, and this seems surprising with the vast potential of Lakes Erie and Ontario before us. However, it should be noted that there are few natural harbors along the shores of these lakes in which protected marina facilities can be located, and the cost of developing marinas, with their required protection, in the Lakes is extremely high if not prohibitive. The Federal government is progressing a program of "Harbors of Refuge" that will permit construction of increased marina facilities, but when and if completed years from now the projected capacity would not be significant in meeting total needs.

The natural inland lakes, as previously discussed under "Swimming"

BOATING

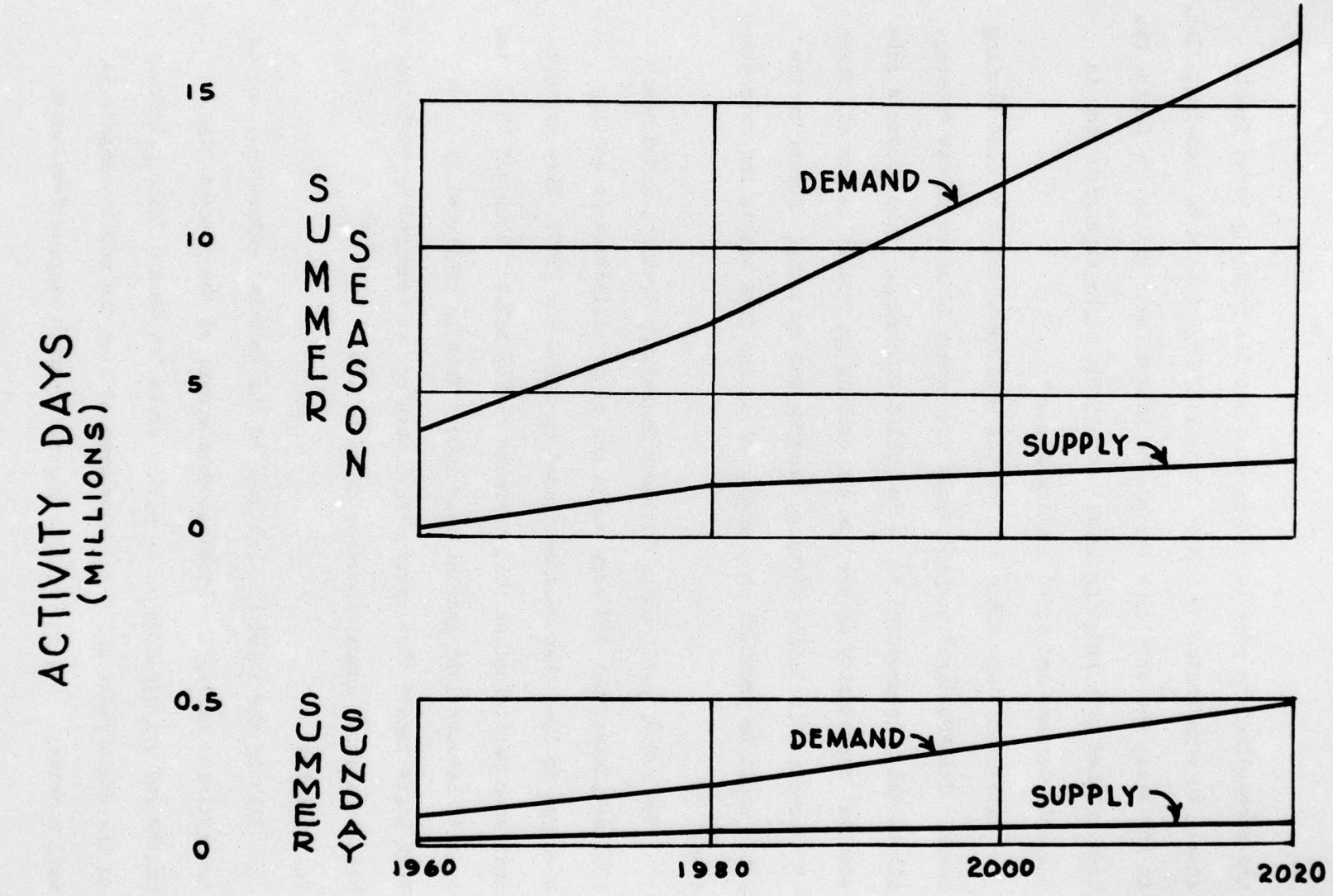


FIGURE 3.

FIGURE 3

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are monopolized by private owners with but few publicly owned frontages. In some instances public boat launching sites have been installed. In any case, the safe capacity of the inland lakes within the Region has been reached with existing users, and little major expansion room is possible for new and added boating activity.

Artificial impoundments offer the best opportunity to meet boating needs. The "Portage" project would have about 20 miles of new frontage all of which is proposed to be in public ownership. This offers a substantial opportunity to provide new boating opportunities for all forms of recreation including fishing, boating and canoeing. Access to the water would be provided at a number of points from within the recreation area.

The B.O.R. publication "Outdoor Recreation Trends", dated April 1967 estimates that 38% more occasions of participation in boating occurred in 1965 than were estimated by ORRRC for 1960. They project that such participation will increase by 76% between 1965 and 1980, and by 215% between 1965 and the year 2000. This is confirmed by a New York State report that recreational boating, as measured by registrations, has a sustained annual increase of 6% to 10%.

(4) Camping

This is the third highest need of the four key activities, and is the activity having the greatest development at the present time in public and private areas. In public areas the demand falls primarily on the State parks and a major program to meet the public demands is well underway. The following summarizes public camping development

FIGURE 4.

FIGURE 4

within and immediately adjacent to the Basin. Letchworth State Park operated 208 campsites in 1966 with 69,000 camper days and a turn-away demand. This will be increased to 280 campsites in 1967 with an anticipated 100,000 camper days' usage. Stony Brook State Park operated 101 campsites in 1966 with attendance of 43,000 camper days. At Hamlin Beach State Park on Lake Ontario 266 new campsites will open in 1967 with an anticipated use of 100,000 camper days. A third 270 unit camping area (100,000 camper days) in Lakeside Beach State Park on Lake Ontario, 15 miles west of Hamlin, will open in 1968 and it is planned that capacity at Darien Lakes State Park in Genesee County will be 270 modern units (100,000 camper days) by 1970. However, it appears that, as fast as these are developed the demand increases and it is apparent that these new capacities will by no means meet public requirements.

In the private sector many low-quality campsites have proliferated. In most instances these offer little more than rutted dirt roads, campsites of no distinction in former farm fields or wood lots, and inadequate pit toilets. The public is not satisfied with these facilities and will only tolerate them until higher grade campsites are provided -- usually by public agencies. The Task Group agrees with the comments in Part 2 (B.O.R.) in this regard.

The recreation areas proposed to be established surrounding the Portage project impoundment will be a prime opportunity to improve the supply of campsites to the public. Conditions would be ideal with rugged terrain, to a great extent wooded, beautiful scenic lake views, availability of boating and swimming as supplementary activities, and

the proximity of the nationally famous Letchworth State Park scenic falls and gorges. This would be the area to concentrate our major efforts with respect to camping in the near future.

B.O.R., in their publication "Outdoor Recreation Trends", dated April 1967, estimates that 62% more occasions of participation in Camping activity occurred in 1965 than were estimated in the ORRRC report for 1960. They estimated participation will increase 78% between 1965 and 1980, and will increase 238% between 1965 and the year 2000.

(5) Picnicking

Estimates in Part 2 (B.O.R.), and plotted on Figure 5, appear to show that picnicking demand and supply will result in the smallest unsatisfied Needs among the key activities. In part this is based on the assumption that needs are met by "simply picnicking on the ground in almost any available area", as well as in defined picnic areas. It is agreed that this happens in many instances. However, it is considered that, to a great extent, this results from insufficient supply of improved picnic grounds with parking areas, tables, fireplaces, comfort stations, shelters, play equipment and related improvements which the public will prefer to use if available. It is most certain that material unsatisfied needs for improved picnic facilities exist in the 18 counties. Looking to the future, opportunities for informal roadside picnicking will be steadily diminished by "urban sprawl", increased traffic, and the accelerating tendency of private owners to fence and post their lands against public intrusion, in part due to

PICNICKING

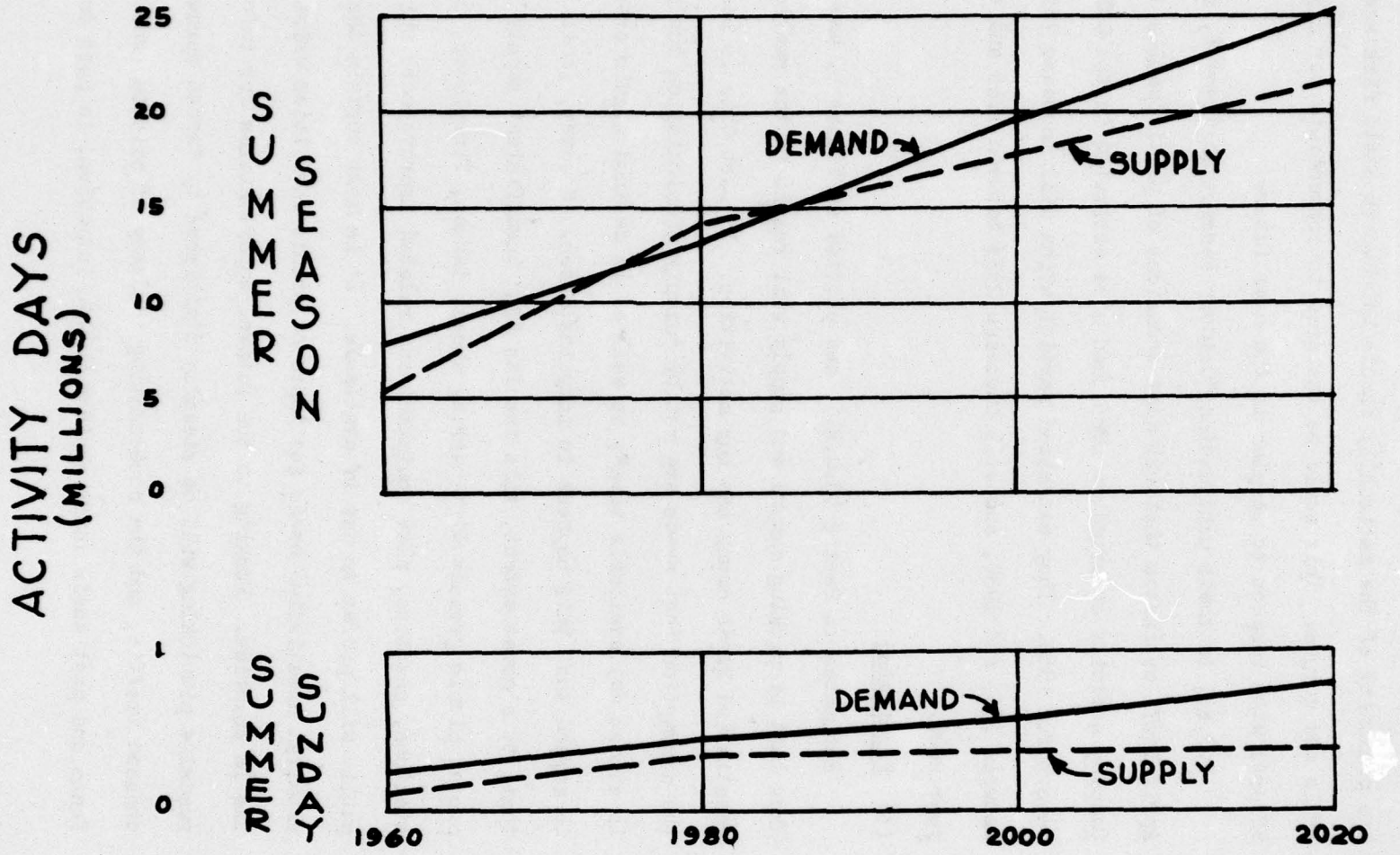


FIGURE 5.

FIGURE 5

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the serious clean-up problem after informal picnics. B.O.R., in their April 1967 publication "Outdoor Recreation Trends", indicates that 63% more occasions of participation in picnicking occurred in 1965 than reported by ORRRC for 1960. By 1980, they predict 48% more individuals will participate than in 1965, and by the year 2000, 127% more than in 1965. It is apparent that complacency is not in order.

Sec. 1-E State Parks in or Immediately Adjacent to the Basin

Figure 6 shows State Parks within the Basin that bear the brunt of the Recreation Demand. In order of 1966 attendance, they are:

State Park	Area±	1966 Attendance	Remarks
Letchworth	14,400	3/4 million	50% developed
Hamlin Beach	1,200	1/3 million	Expansion underway
Darien Lakes	950 (ult.1800)	62,000	Undeveloped
Stony Brook	570	43,000	Developed
Braddock Bay	2,300	25,000	Undeveloped
Silver Lake	800	3,500	Undeveloped
Lakeside Beach	650	2,500	Undeveloped

Lake Ontario State Parkway 1967-23 miles; 1970-48 miles; 1972-60 miles.

While many of these parks are undeveloped, a 20 year program has been initiated, funded at $15,000,000. for the first ten years. It should be noted that the programmed increase in facilities has been included in estimates of Supply for future years, as previously presented.

Figure 7 shows the increases in acreage for these parks since 1930. Recent increases reflect funds made available by New York State's 100 million dollar Park Land Bond Issue of 1960-61. It should be emphasized that this acreage is shown by this study to be insufficient to provide for predictable Demand, and additional areas must be provided.

The 21,000± acres encompassed within the "Portage" project will provide a major step toward meeting land requirements.

Figure 8 shows attendance increases for these parks since 1945. Note that attendance cannot be considered as a measure of Demand, but reflects an increase in Supply due to Recreational Developments. At no time has Supply met Demand in this period.

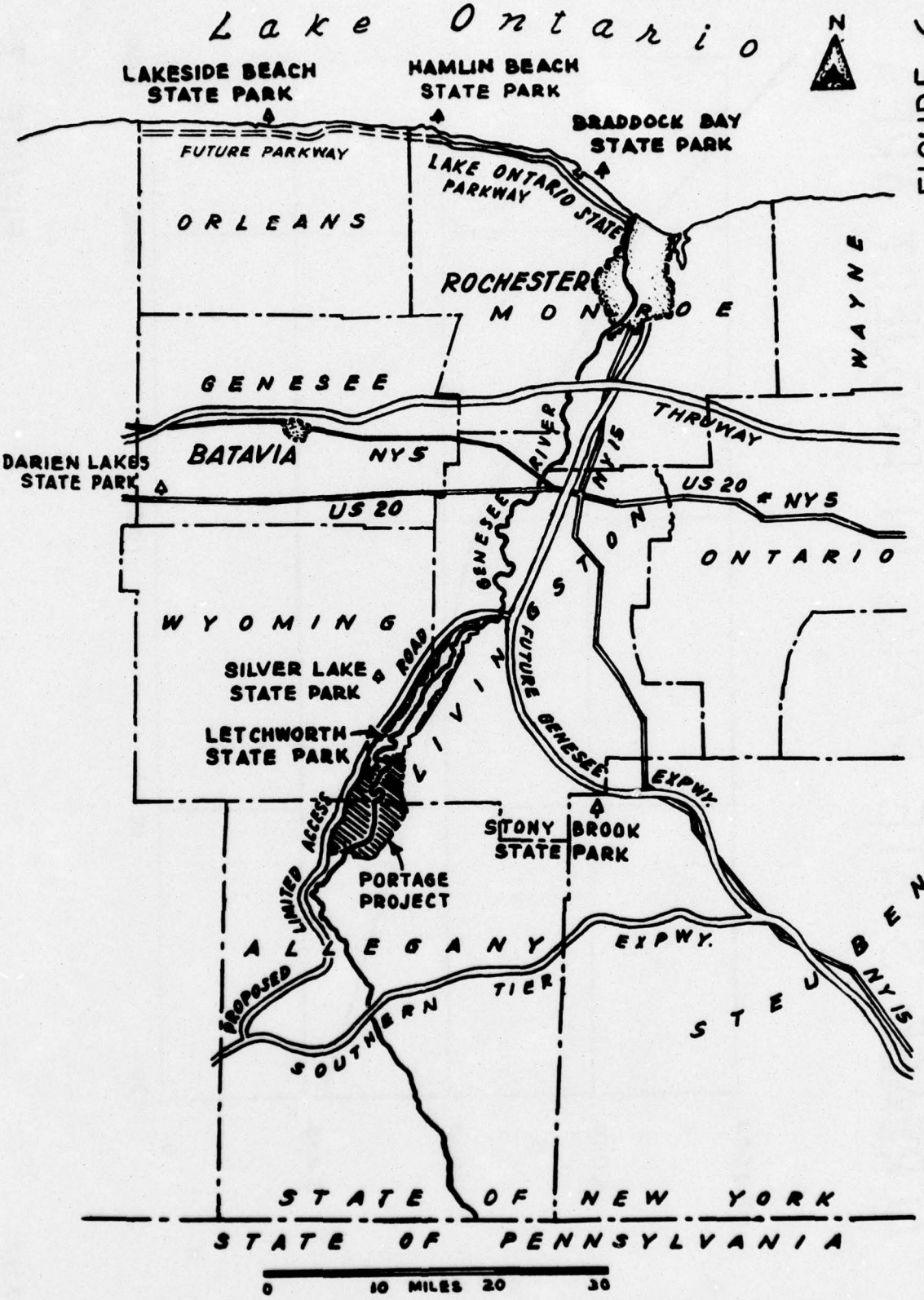


FIGURE 6.

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STATE PARKS WITHIN THE GENESEE RIVER AREA.

ACREAGE STATE PARKS IN PROJECT AREA

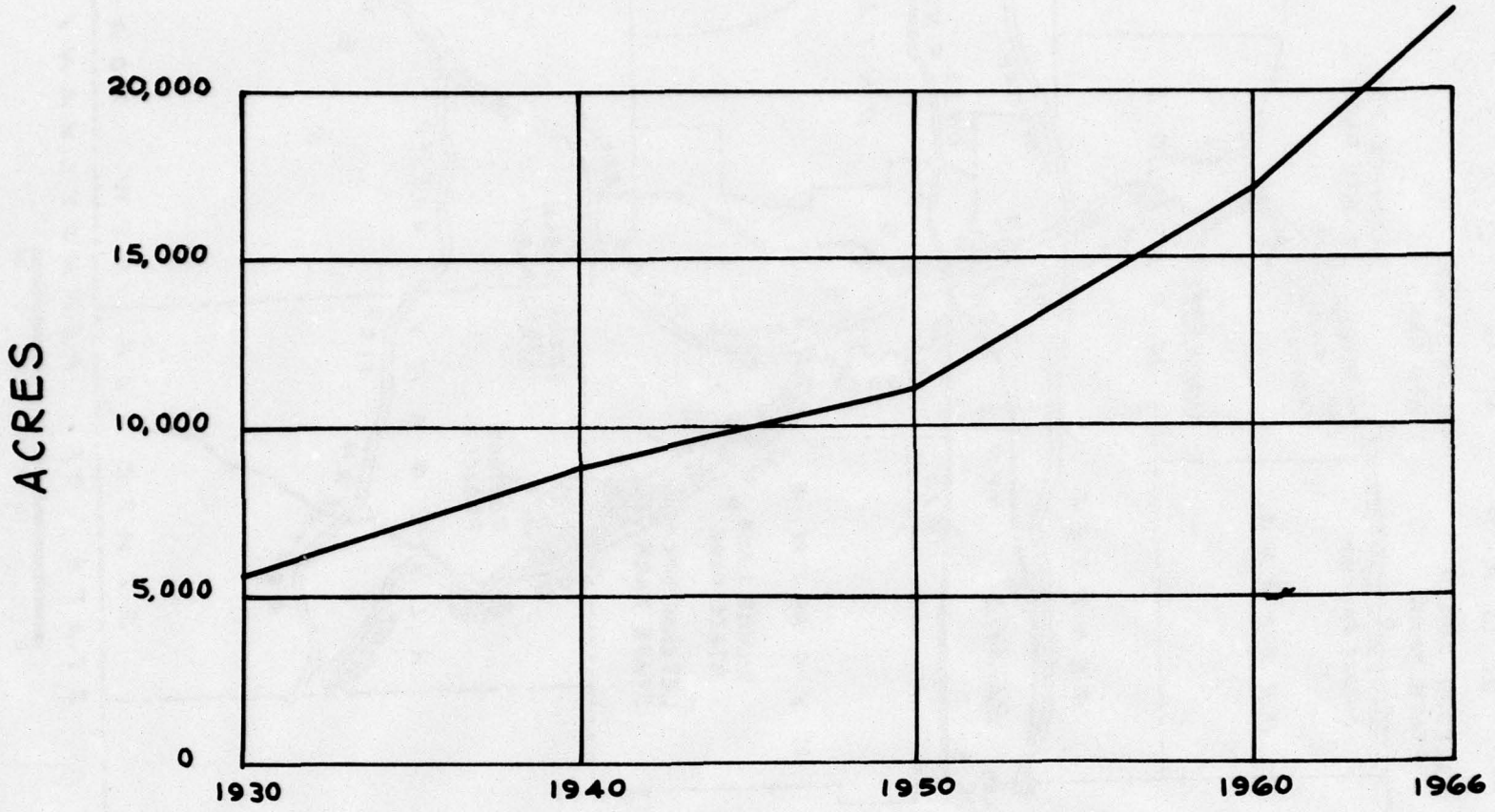


FIGURE 7.

FIGURE 7

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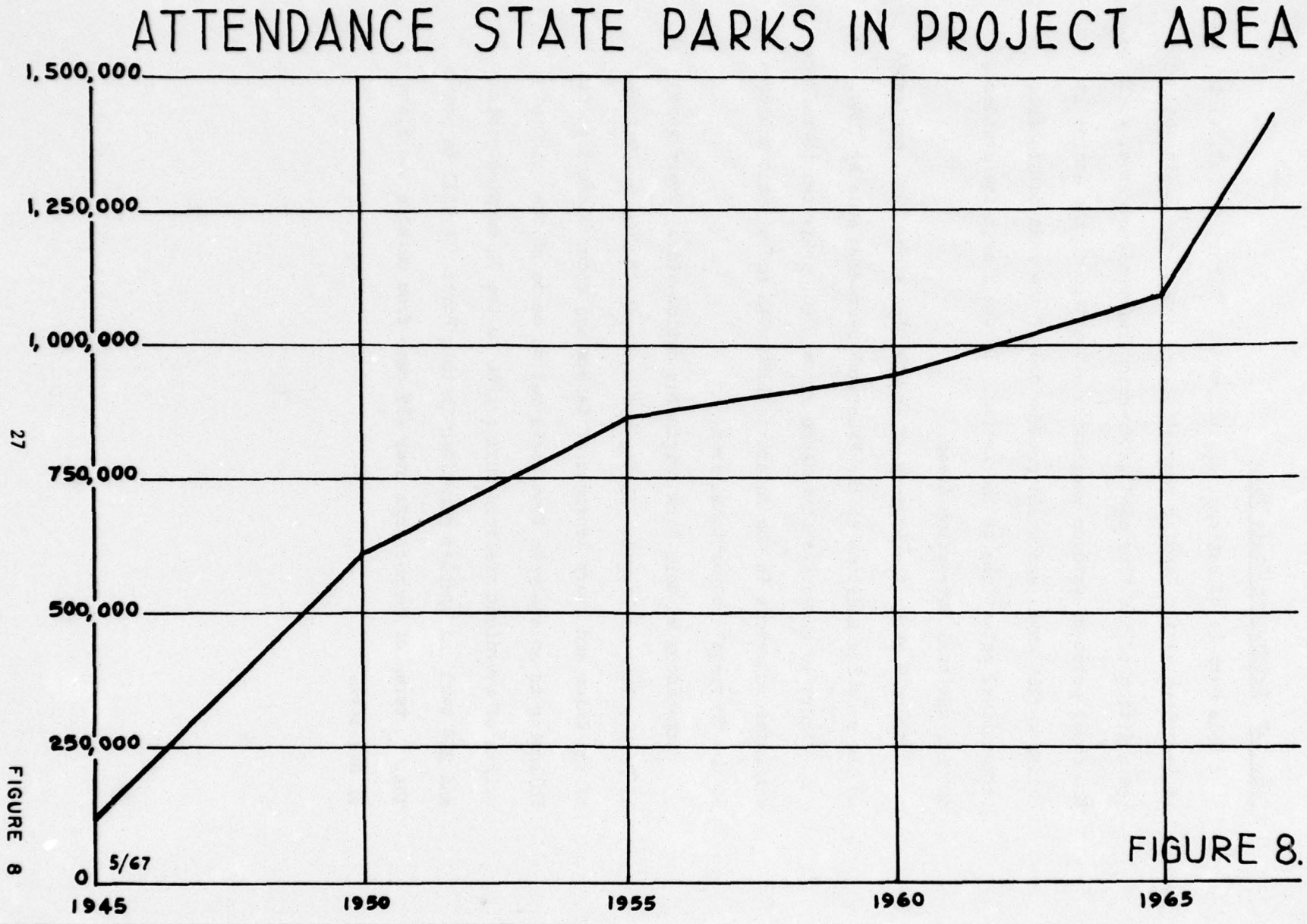

ATTENDANCE STATE PARKS IN PROJECT AREA
1,500,000
1,250,000
1,000,000
750,000
500,000
250,000
0
1945
1950
1955
1960
1965
5/67
27
FIGURE 8

FIGURE 8.

Sec. 1-F Letchworth State Park

This Park is of national significance. In Part 2 (B.O.R.) it is described as the leading recreational asset of the Basin and, with the addition of the "Portage" water-based recreational area, would be the focal point of outdoor recreation attraction in the entire 18 county market area, and could produce one of the most outstanding recreational potentials of the nation. It would meet the standards set for National Recreation Areas.

Figure 9 shows its history of acquisition since 1920, projected to the possible addition of the "Portage" recreation area by 1980.

Figure 10 shows its attendance since 1940, projected to reflect estimated increases in the future to 1980 with and without addition of the "Portage" recreational area.

Attendance at this Park originates nation-wide. Every year at Park entrances license plates are checked off from every State of the Union and every Province of Canada and other distant points. Following is an analysis from registration cards of the point of origin of overnight visitors during 1966 to the 72 camping cabins and 208 tent and trailer campsites in this Park. It will be noted that in terms of camper days over 40% came from outside the State of New York.

Where From	Camper Days	Percentages
New York State (West of Geneva)	39,572	42.2%
New York State (East of Geneva)	16,035	17.1%
Pennsylvania	9,940	10.6%
Canada	7,502	8.0%
Ohio	7,314	7.8%
New Jersey	3,282	3.5%
Michigan	2,532	2.7%
Massachusetts	1,969	2.1%
Other (33 States, D.C., Australia, Germany, Switzerland and Ireland)	5,627	6.0%
	93,773	100.0%

Figures 11 and 12 are photographs illustrating the scenic splendors of this Park.

Obviously, these assets will combine with and enhance the recreational values of the "Portage" project.

LETCHWORTH PARK ACREAGE

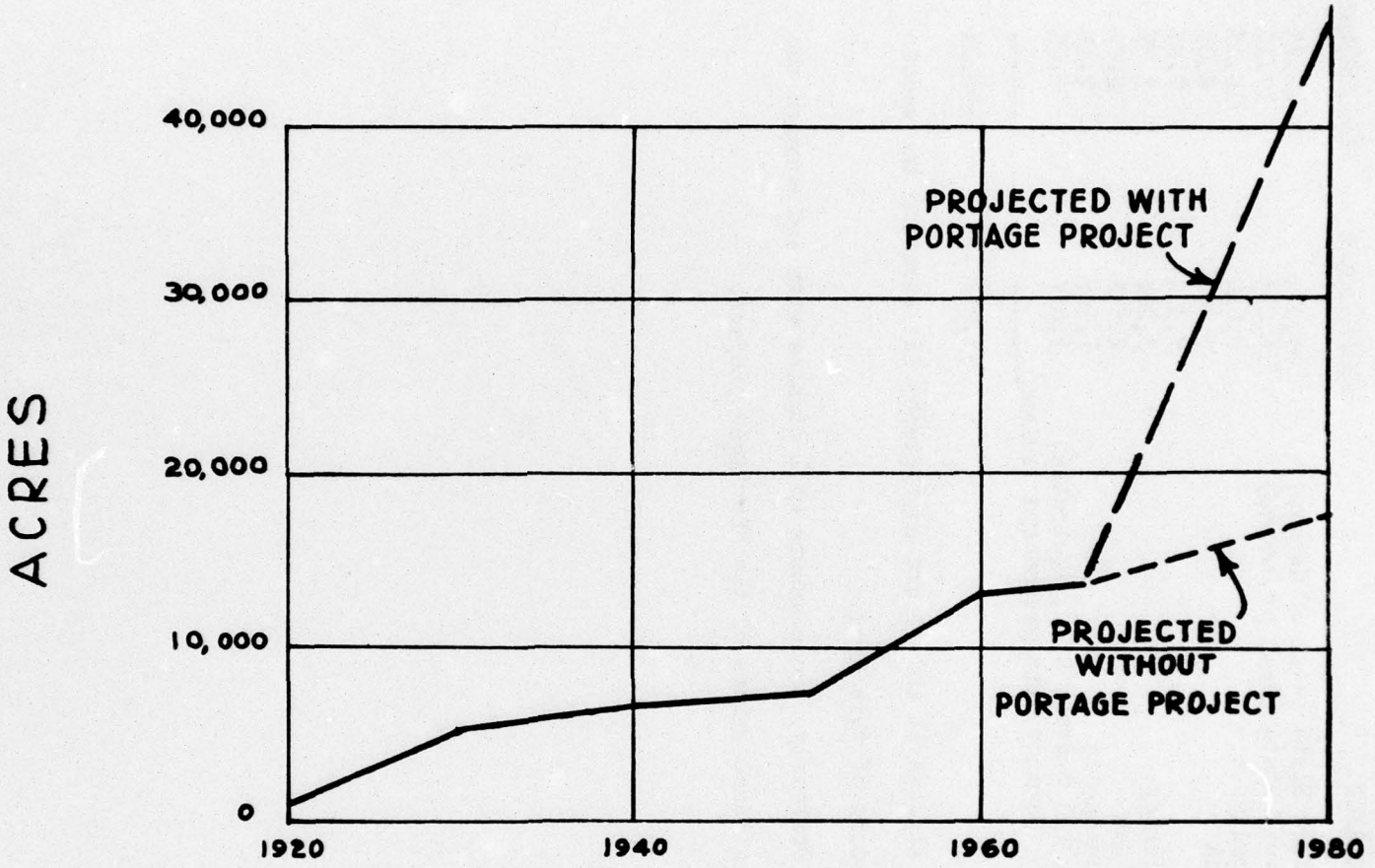


FIGURE 9

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FIGURE 9.

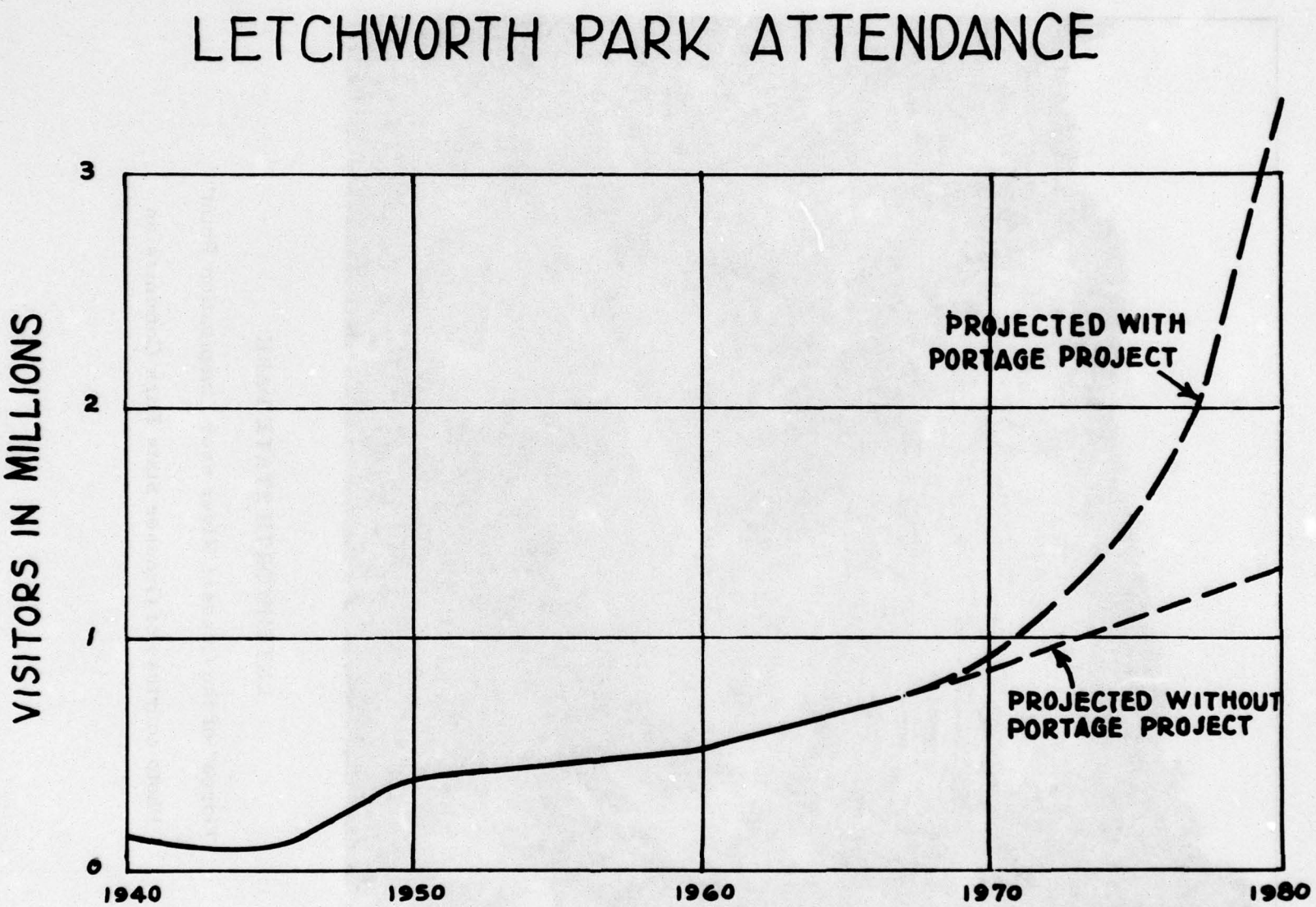


FIGURE 10.

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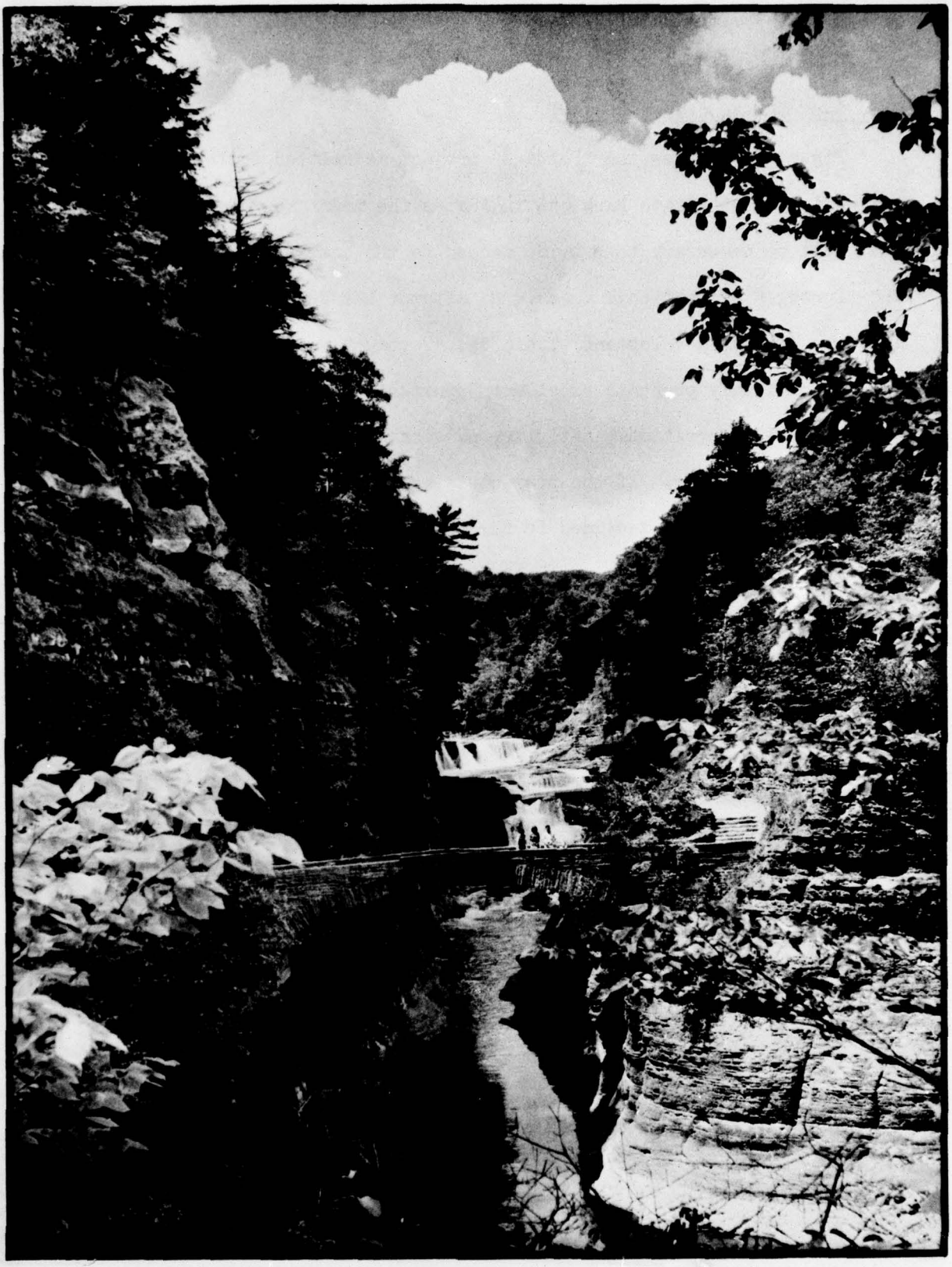
FIGURE 10



LETCHWORTH STATE PARK

"Gorge" of the Genesee River near "Inspiration Point"

Photo courtesy of Genesee State Park Commission



LETCHWORTH STATE PARK

"Flume" of the Genesee River at the Lower Falls
Photo courtesy of Genesee State Park Commission

Sec. 1-G The "Portage" Project

Figure 13 defines the "Portage" project as related to the existing Letchworth State Park and indicates the major new road system that will be necessary to provide access to the combined Letchworth and "Portage" recreational areas. No attempt has been made to develop a Master Plan of development within the "Portage" area. The area as defined obviously presents excellent opportunities for development of every type of recreational activity, particularly camping, boating, fishing and swimming. If the project is approved, a Master Plan of Development should be included in the succeeding detailed Study previously recommended. It should be noted that the plan contemplates the total removal of the Village of Portageville.

Salient features of the plan presented in Figure 13 are:

1. Proposed Mt. Morris Dam Impoundment within Letchworth State Park

This would result from adoption of Corps of Engineers' "Portage" Project, Plan C, Run 1-A, as a necessary part of the proposed pump-storage electrical generating facility. It is the opinion of the Task Group that this impoundment, having a fluctuation of less than 2 feet during the season May 1 to November 1, except in a flood emergency, will not detract from the scenic values of the Park but will add recreational values principally in boating and fishing. Access is feasible from the existing tent and trailer camping area and from other areas of the Park. It is recommended that it be operated under a rule prohibiting boat motors of any kind.

2. Boundaries of "Portage" Recreation Area

These were defined with the following factors in mind:

(a) The boundaries must be an extension of, and complement the present and proposed future boundaries of the existing Letchworth State Park.

(b) They must totally encompass all of the shoreline of the proposed impoundment. This is necessary to insure that one public agency have jurisdiction and control over all approaches to the waters of the impoundment in order that regulation of use be in a single authority, and that no private lands may abut the impoundment or be in a position to claim special privileges.

(c) Following "Conditions" previously stated, the boundaries should, in general, extend to the ridge lines on either side. On the west side a series of large gullies on the side slope make it necessary to establish the limited access scenic road on the relatively level ground above the head of the gullies. The land on the side slopes between the impoundment and the scenic road is wild and wooded, excellent for park purposes. On the east side, topography would make it difficult to establish a north-south access road between the existing railroad and the impoundment, although this would be most desirable. Therefore the easterly line is recommended to be sufficiently above the railroad to permit the construction of a north-south road within the recreation lands and to provide an adequate protective strip.

3. The Limited Access Scenic Road (West Boundary)

Within the existing Letchworth State Park the existing north-south Park road, while scenically beautiful, is inadequate and possibly dangerous in carrying its present traffic load. Widening, regrading and realignment at its present location would be difficult, costly, and would destroy its present scenic values. Whether or not the "Portage" project is adopted, to carry present and future traffic a new, major road must be constructed outside the westerly border of the present Park, connecting with the proposed Genesee Expressway to the north, Route 19-A near Portageville to the south, and to the four westerly Park entrances. The present Park road would then adequately serve as a scenic interior distribution road.

The southerly extension of the limited access scenic road along the westerly boundary of the "Portage" recreation lands would be necessary, not only to replace Route 19-A, which will be flooded, but also to provide access to Fillmore and Wiscoy, and to provide for the tremendous future traffic which will be engendered by the predicted 2,000,000 visitors per year to this important recreation area.

It should be noted that the projected southerly terminus of this limited access scenic road will be but 12.5 miles north of the projected Southern Tier Expressway (see Figure 6). If extended to complete the connection between the Genesee Expressway to the north and the Southern Tier Expressway to the south, it will fill an obvious gap in the expressway traffic pattern. An official of the New York State Department of Public Works informed this Committee that previous studies

had indicated a need for a traffic corridor in this general area. This proposed scenic road would meet that need as well as the recreational needs, reviewed above.

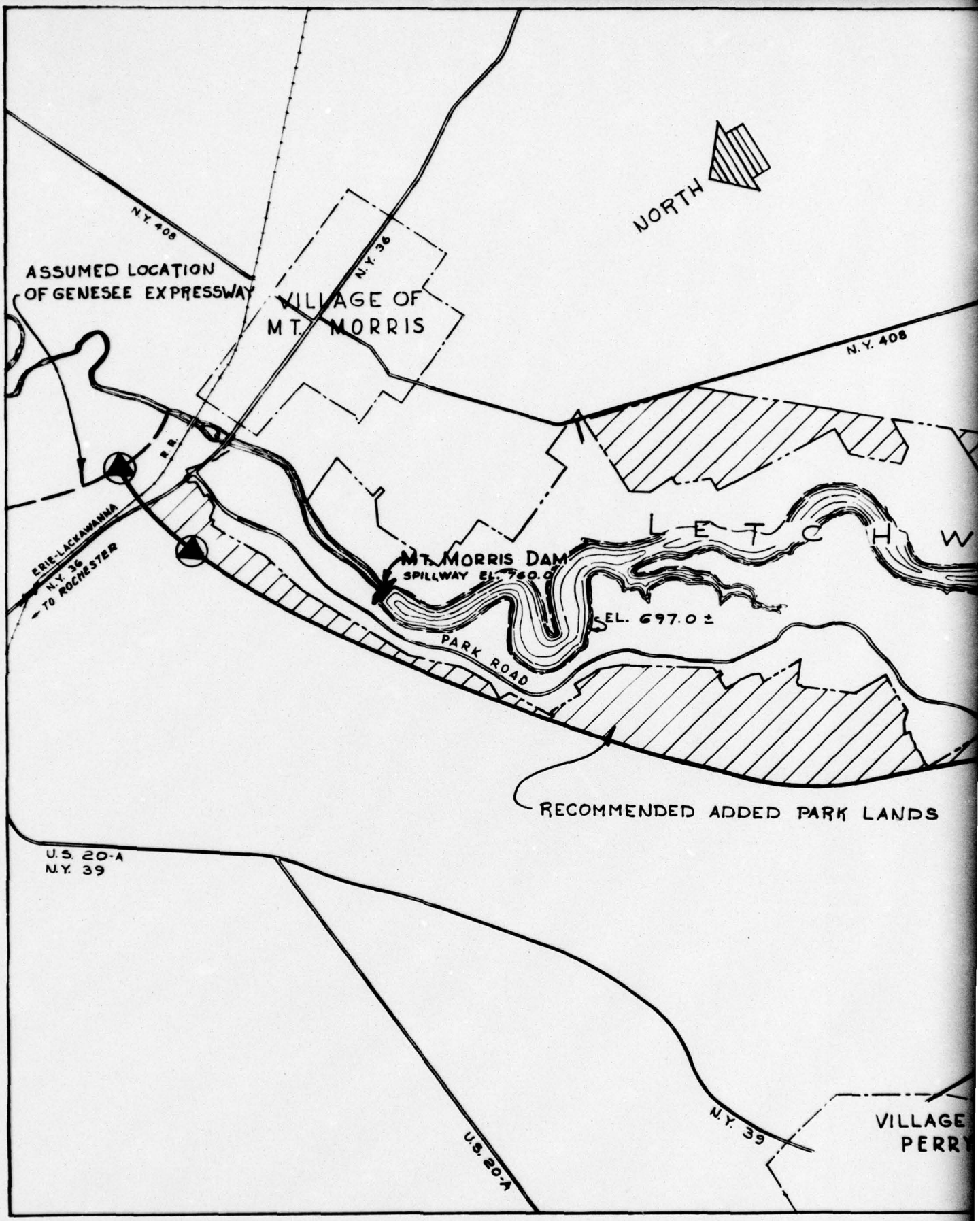
To meet the combined recreational and commercial needs to be served by this road, it is recommended: (1) the road should be designed and constructed to parkway standards as a limited access scenic road, and be operated as an expressway for both pleasure and commercial traffic; and (2) except at the Villages of Wiscoy and Fillmore, all lands between the scenic road and Letchworth State Park or the "Portage" recreational lands, be acquired for park purposes.

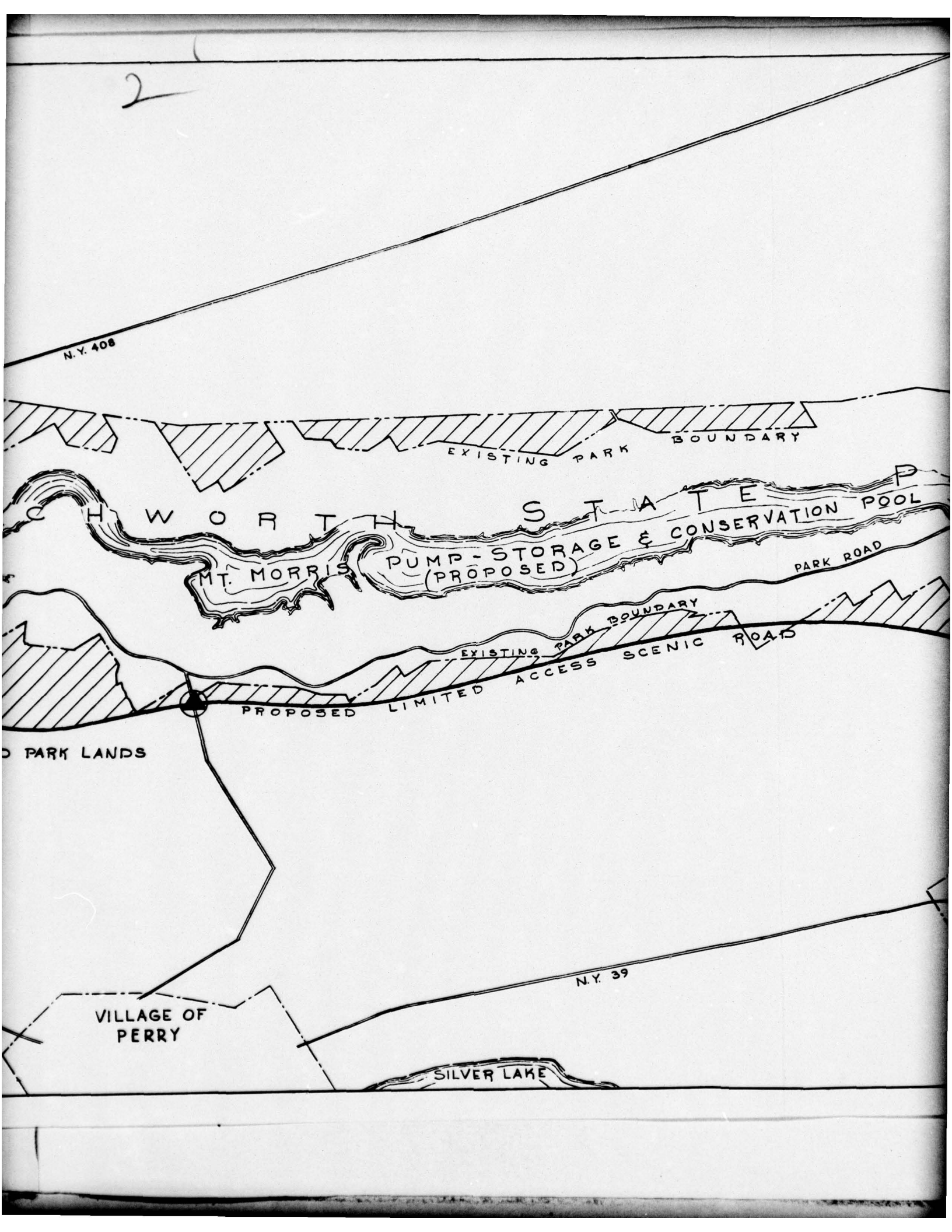
4. Dike at Fillmore

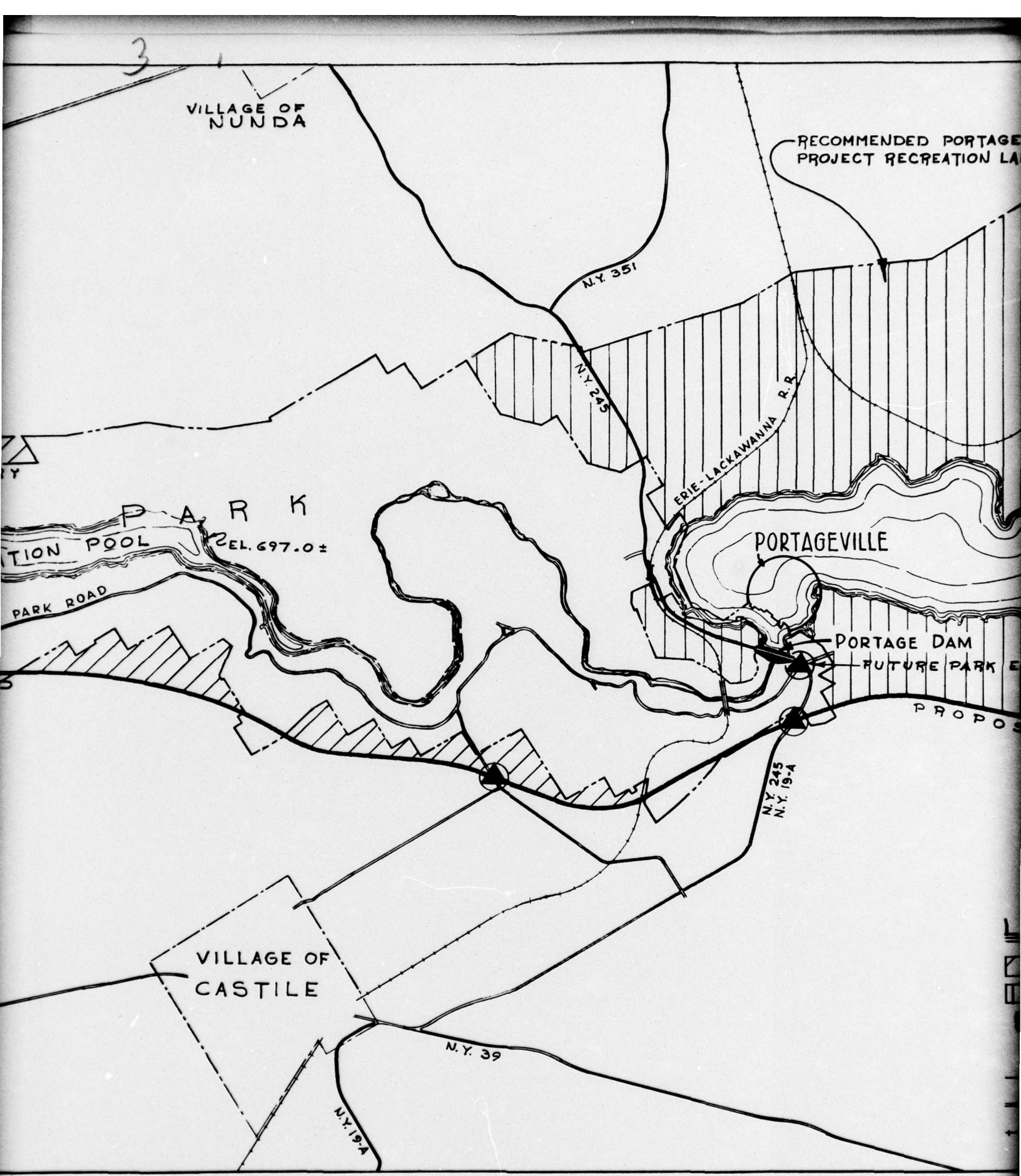
It is understood that, to prevent excessive appropriation of improved properties at this Village, a protective dike is proposed between the Village and the "Portage" impoundment. It is recommended that, if adopted, this dike be designed of sufficient width to carry a connecting road between segments of the recreation area north and south of the Village, that otherwise would be disconnected except by passing through the Village. A fence on the dike between the road and the Village would be an essential. The objective should be to tie the recreation areas together as a cohesive whole, with a limited number of controlled access points, to be defined in the proposed Master Development Plan.

5. Zoning Water Areas

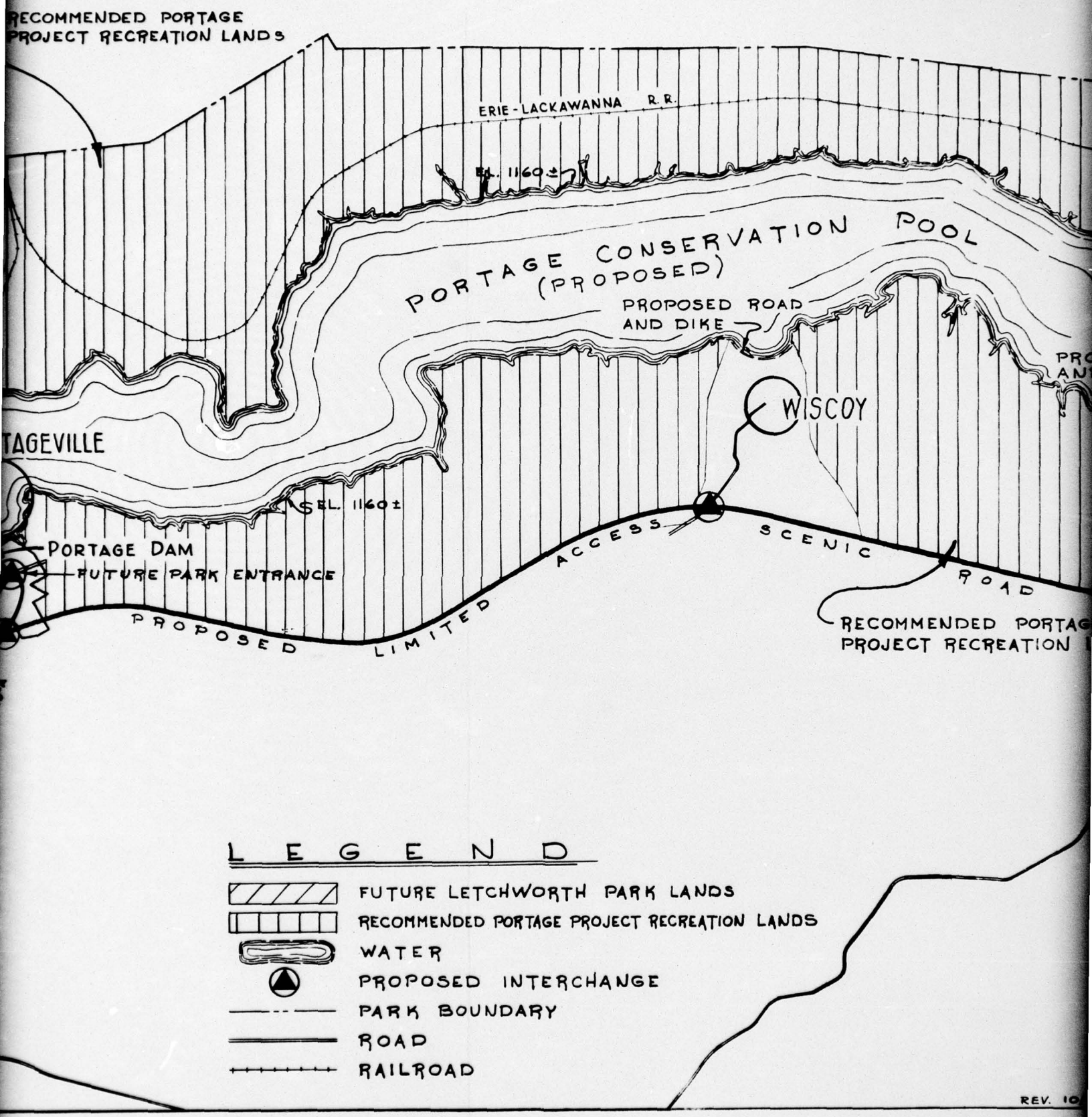
In order to protect fishing which we consider to be a major potential benefit, a zoning plan for the water area will be required as well as formal arrangements for regulation of the reservoir levels in a manner that will be compatible with the various forms of recreation.


NORTH
N.Y. 408
N.Y. 36
ASSUMED LOCATION
OF GENESEE EXPRESSWAY
VILLAGE OF
MT. MORRIS
N.Y. 408
R.R.
ERIE-LACKAWANNA
N.Y. 36
TO ROCHESTER
MT. MORRIS DAM
SPILLWAY EL. 760.0
L E T C H W
EL. 697.0 ±
PARK ROAD
RECOMMENDED ADDED PARK LANDS
U.S. 20-A
N.Y. 39
N.Y. 39
U.S. 20-A
VILLAGE
PERRY


2
N.Y. 408
EXISTING PARK BOUNDARY
C H W O R T H S T A T E P
MT. MORRIS PUMP-STORAGE & CONSERVATION POOL
(PROPOSED)
PARK ROAD
EXISTING PARK BOUNDARY
PROPOSED LIMITED ACCESS SCENIC ROAD
D PARK LANDS
N.Y. 39
VILLAGE OF PERRY
SILVER LAKE


3
VILLAGE OF
NUNDA
RECOMMENDED PORTAGE
PROJECT RECREATION LA
N.Y. 351
N.Y. 245
ERIE-LACKAWANNA R.R.
P A R K
TION POOL
EL. 697.0 ±
PARK ROAD
PORTAGEVILLE
PORTAGE DAM
FUTURE PARK E
PROPOS
N.Y. 245
N.Y. 19-A
VILLAGE OF
CASTILE
N.Y. 39
N.Y. 19-A

4



LEGEND

- FUTURE LETCHWORTH PARK LANDS
- RECOMMENDED PORTAGE PROJECT RECREATION LANDS
- WATER
- PROPOSED INTERCHANGE
- PARK BOUNDARY
- ROAD
- RAILROAD

REV. 10/



LETCHWORTH STATE PARK AND THE RECOMMENDED PORTAGE RECREATION AREA

SCALE IN FEET

0 5,000 10,000 15,000

REV. 10/4/67

5/5/67

37a

FIGURE 13

GENESEE RIVER BASIN

COMPREHENSIVE

STUDY OF

WATER AND RELATED LAND RESOURCES

Comprehensive Study of Outdoor Recreation

Prepared by

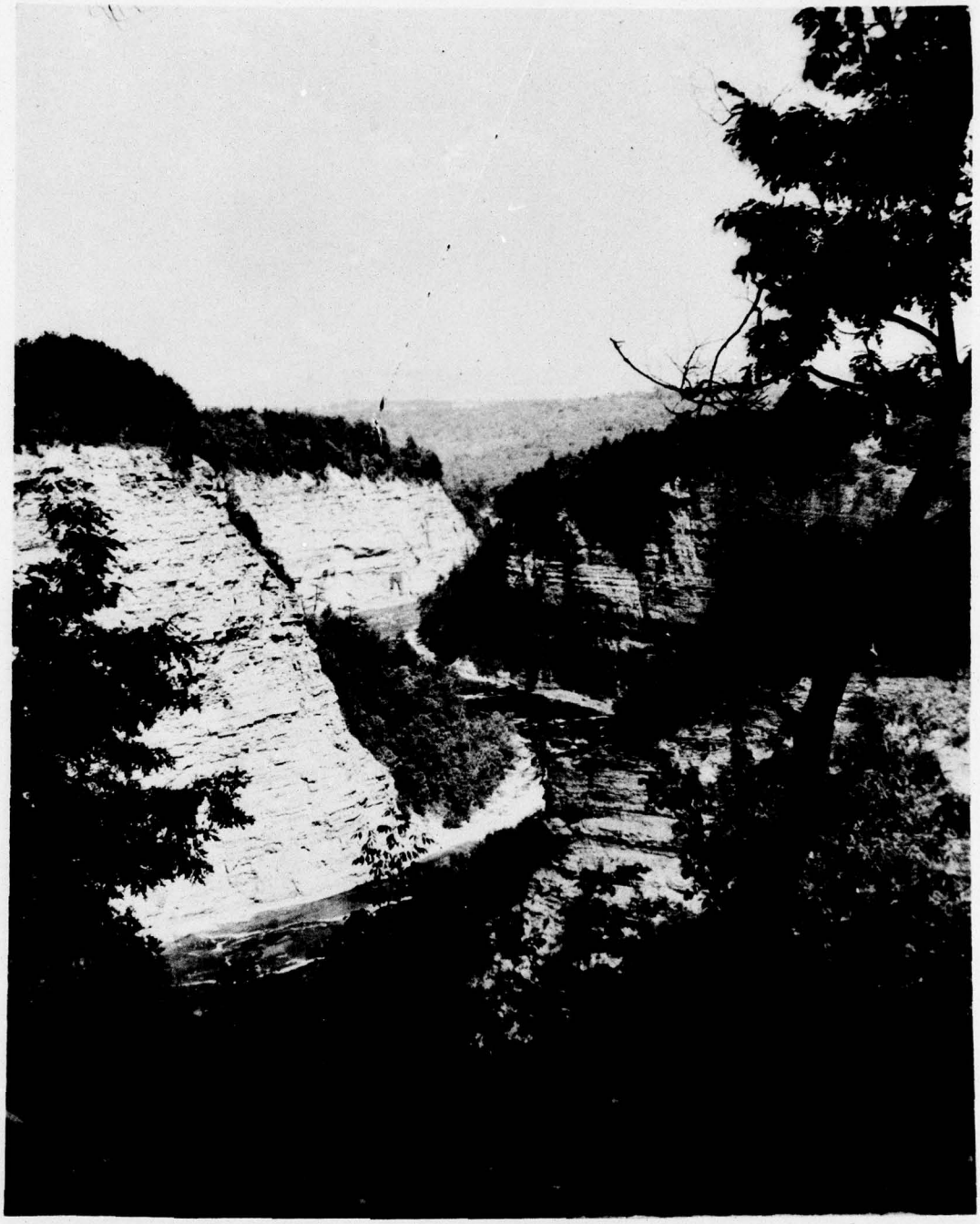
DEPARTMENT OF THE INTERIOR

Bureau of Outdoor Recreation

Northeast Region

Philadelphia, Pennsylvania

June 1967



GENESEE RIVER GORGE, LETCHWORTH STATE PARK, NEW YORK

SYLLABUS

The Genesee River Basin covers 2,479 square miles, mostly in western New York, with a small portion in northwestern Pennsylvania. The source of the Genesee River is in the highlands of Potter County, Pennsylvania. From here, the river flows northward into New York, passes through the scenic gorge in Letchworth State Park, and thence through the broad Genesee Valley to Lake Ontario at Rochester.

The natural recreation resources of the Genesee Basin and its market area provide a wide variety of opportunity for development, enhancement, and preservation. Public and privately-operated recreation areas and attractions are numerous and currently offer extensive and diversified programs for residents as well as the visiting tourist.

The Genesee River Basin and its recreation market area are composed of 14 counties in western New York and four counties in northwestern Pennsylvania. For planning purposes, the counties were grouped into recreation subareas as follows:

Metropolitan	Barge Canal	Central Plains	Allegany Plateau
Erie	Orleans	Genesee	Allegany
Monroe	Wayne	Livingston	Cattaraugus
Niagara		Ontario	Chautauqua
		Wyoming	Steuben
		Yates	McKean (Pa.)
			Potter (Pa.)
			Tioga (Pa.)
			Warren (Pa.)

The 14 New York counties presently contain 16 percent of that State's population, 75 percent of which is within the metropolitan areas of Buffalo and Rochester. The total population of the market area in 1960 was 2,705,400. It is expected that this population will nearly double by the year 2020; more than double in the metropolitan areas.

All indications point toward general economic improvement of the region. Improved transportation, increased congestion of metropolitan centers, and decentralization of industry will, in all probability, attract more people into the less populated sections of the Genesee Basin. These people will likely be a mixture of permanent and seasonal residents. In many cases they will bring with them industries which are becoming less dependent on proximity to natural resources and markets.

Estimates of outdoor recreation demand were based on 1960 and projected populations of the recreation subareas, and upon current and projected per capita participation rates for selected outdoor recreation activities. Boating, camping, picnicking, and swimming, four activities which are

---

(Frontispiece courtesy of Genesee Park Commission).

either directly related to or enhanced by water were considered key activities since they constitute a convenient index to the type and scale of development required to accommodate the majority of water-oriented recreation uses.

Outdoor recreation supply is recognized as having two major forms - existing areas and facilities and those which have been programmed for completion at a future date. The supply of recreation resources in the subareas was inventoried according to the capacity of the resource to accommocate demand for the four key activities.

A comparison of demand and supply in the subareas resulted in the conclusion that demand in terms of recreation days will more than quadruple over the period 1960 to 2020. Present and projected supply will be insufficient to meet this demand, especially for the water-oriented activities of boating and swimming.

It was decided that a critical assessment of needs should be made for the year 1980 because presently known public and private recreation programs and proposals can reasonably be expected to materialize by 1980, and demand and supply projections tend to be more reliable for the period 1960-80 than for 1980 to 2000 or 2020.. Also, a comparison of the demand for and the supply of facilities on a capacity day during a week (typical summer Sunday) reflects more adequately outdoor recreation needs than a similar comparison on an annual or seasonal basis.

It is estimated that on a typical summer Sunday, 1980, there will be a need for 600,000 recreation days of opportunity in the Genesee River Basin and its recreation market area. About 31,000 acres of land and 89,000 acres of water will be required to supply opportunity for the needed recreation days in 1980. By the year 2020, it is estimated that 206,000 acres of land and 225,000 acres of water will be required to fulfill the demand.

Potential outdoor recreation resources of the Genesee River Basin and the market area were identified and evaluated according to the capability and desirability of these resources for recreation development. If developed by 1980, the total potential resources of the Genesee Basin and market area, especially the Corps of Engineers' potential reservoir impoundments and their proposals for small boat harbor improvements on Lakes Erie and Ontario, would provide a significant impact on the overall computed needs for land and water.

The identification and evaluation of the resources were assumed to be a reasonable measure of the outdoor recreation potential these resources could achieve. All potential impoundments were not recommended in spite of the demonstrated need for projects to provide water-oriented recreation opportunity. This represented resource planning judgment as well as individual project feasibility.

The outdoor recreation plan contained in this report consists primarily of recommendations for the development of resources within the Genesee River Basin. These recommendations are considered to be practical proposals to provide opportunity for the four key activities as well as other water-oriented or water-enhanced outdoor recreation activities.

A digest of the recommendations contained in this report follows:

(1) The Corps of Engineers and Soil Conservation Service water resource development programs contained in the outdoor recreation plan should include recreation as a project purpose.

(2) The Corps of Engineers' Portage reservoir project, in association with adjacent Letchworth State Park, should be implemented as soon as possible.

(3) The Soil Conservation Service should seek sponsorship for the projects in the outdoor recreation plan as single purpose recreation or multiple purpose recreation--fish and wildlife conservation sites. Priority should be afforded Sites 7-2, 19-11, and 20-2.

(4) The development of two recreation sites on the New York State Barge Canal within the Genesee Basin and six small access areas on the Genesee River should be included within the ten year action program of the New York Statewide Comprehensive Outdoor Recreation Plan.

(5) The Finger Lakes Trail branch from Allegany State Park through Portageville to Bath is recommended for sponsorship and completion and should be routed to the proposed site of the Portage Dam.

(6) An extension of the Finger Lakes Trail from near Almond Reservoir at Hornell to the headwaters of the Genesee River is recommended.

(7) The proposed North Country National Scenic Trail should pursue a route from the headwaters of the Genesee River northwesterly along the Allegheny River to join the Conservation Trail in Allegany State Park.

(8) The "3-Rivers Rise" area at the headwaters of the West Branch of the Susquehanna, Genesee, and Allegheny Rivers should be preserved in its natural state and be included in the action program of the Pennsylvania Statewide Outdoor Recreation Plan.

Genesee River Basin
Comprehensive Study of Outdoor Recreation

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Part I Introduction.

A. Authority.

The Bureau of Outdoor Recreation is authorized to engage in comprehensive water and related land resource studies through the Bureau's Organic Act, Public Law 88-29, May 1963 (77 Stat. 49).

B. Purposes.

The primary purposes of this report are: (1) to provide an evaluation of current and future outdoor recreation needs within the basin and in its area of influence; (2) to set forth a plan to meet these needs; (3) to serve as an outdoor recreation planning base for potential water and related land resource projects; (4) to provide a technical source of reference for the overall Study, Plan Formulation Task Group, in developing a plan of the multiple purpose development of the Genesee River Basin; and (5) to evaluate the recreation aspects of potential Federal water resource developments in sufficient detail to serve as a basis for authorization of the recreation component of such projects as may be recommended for construction.

C. Scope.

This report focuses upon the years 1960, 1980, 2000, and 2020. It contains an analysis of needs based upon the estimated demand for and the supply (inventory) of outdoor recreation opportunity in the Genesee River Basin and zone of program influence. Although emphasis is placed upon water-oriented activities, this report considers a broad range of outdoor recreation opportunity offered by various governmental levels as well as the private sector. Current and proposed outdoor recreation programs are evaluated to determine the extent and magnitude of needs. Significant recreation resource potentials are identified as well as their capability to provide opportunity (hence, fulfill needs).

This report presents the Bureau's outdoor recreation plan especially tailored to the water and related land resources of the Genesee River Basin and makes recommendations concerning development, enhancement, and preservation of significant recreation resources inside and immediately adjacent to the basin. Included in the report is an analysis of recreation benefits and costs at potential impoundment sites. Also, benefits and costs were estimated for some recommended recreation developments in and outside the basin not involving impounded waters.

D. Background.

The President of the United States authorized a survey of "The Resources of the New England-New York Region" by the New England-New York Interagency Committee. The succeeding report was published in 39 books or chapters. The Genesee Basin was Part Two, Chapter 33, published in 1954.

Other extensive studies concerning or related to the Genesee Basin have been or are now being conducted by state and/or federal agencies. Some of these are: The Lakes Erie and Ontario Basins, Erie-Niagara Basin, Oswego River Basin, Allegheny Reservoir (Kinzua Dam), Great Lakes Shoreline Recreation, New York State Barge Canal, New York State Comprehensive Outdoor Recreation Plan, and the Pennsylvania Statewide Outdoor Recreation Plan.

In February 1962, the United States Senate, Committee on Public Works, requested the Board of Engineers for Rivers and Harbors to review the reports on the Genesee River, New York, contained in House Document 615, 78th Congress and other reports, with a view to determining whether any modification of the basin-wide plans should be made with respect to improvements for flood control, navigation, and other related water and land resources. The U.S. Army, Corps of Engineers, Buffalo District, was assigned responsibility for the study and requested to coordinate fully with the states of New York and Pennsylvania and other Federal agencies concerned with respect to inter-related programs which may be developed for flood prevention, water supply, pollution abatement, recreation, fish and wildlife management, irrigation, soil conservation, hydro-electric power and other related water and land resource programs.

In November 1962, the Secretary of the Army formed a Genesee River Basin Coordinating Committee and requested the Secretary of the Interior to appoint a member. As a result of the Department's representation on the Coordinating Committee, the Northeast Region, Bureau of Outdoor Recreation was appointed to Task Group #8, the Recreation Sub-Committee of the Genesee Comprehensive Study.

E. Basic Assumptions.

The following basic assumptions qualify the estimates of future recreation demands and needs expressed in this report.

(1) No major depressions, wars, or other catastrophes, which would offset current projections of population and economic growth rates, will occur.

(2) Projection factors presented in ORRRC Study Report 26, properly applied, will produce reasonable projections of demand for the target years of this study.

(3) The Northeast regional participation rates cited in ORRRC Study Report 19 are valid when modified to reflect socio-economic characteristics of the residents of the Genesee River Basin planning region.

(4) Socio-economic changes within the Basin planning region will be reflected by increasing demand for outdoor recreation opportunities.

F. Acknowledgements.

It would indeed be a formidable task to cite all those groups and individuals who have contributed material to this outdoor recreation study--or to those who have consented to listen patiently to and offer constructive advice on the merits of a thought or idea. The following list recognizes some agencies who have made significant contributions to this report.

FEDERAL

U.S. Department of Agriculture
Forest Service
Soil Conservation Service
U.S. Department of the Army
Corps of Engineers
U.S. Department of the Interior
Bureau of Sport Fisheries and Wildlife

STATE

New York
Department of Conservation
Division of Parks
Genesee State Park Commission
Division of Fish and Game
Division of Lands and Forests
Division of Water Resources
Pennsylvania
Joint State Government Commission

PRIVATE

Vollmer-Ostrower Associates, New York, N.Y.

G. General Definitions.

The following definitions are applied to outdoor recreation terminology in this report. Definitions which are specific to Demand, Supply and Needs (Part III) will be presented in those respective sections.

Activity Day. The participation in one activity by one person during any portion or all of a 24-hour day. The term also implies actual or expected occupation of existing or programmed recreation facilities.

Outdoor Recreation. Leisure time activities which utilize an outdoor setting.

Outing. An outdoor recreation occasion away from home occupying the better part of a day.

Recreation Day. A standard unit of use consisting of a visit of one individual to a recreation development or an area for recreation purposes during any reasonable portion or all of a 24-hour period. (Recreation purposes include one or more activities.)

Recreation Market Area. The Genesee River Basin and that surrounding area whose population is expected to exert the greatest influence on and in turn be influenced by proposed outdoor recreation water and related land resource programs occurring within the river basin.

Recreation Subarea. A group of counties within the recreation market area having similar socio-economic and physiographic characteristics.

Summer Season. June, July and August - 13 weeks.

Trip. An excursion away from home for outdoor recreation purposes involving at least one overnight stay - usually a weekend.

Typical Summer Sunday. A theoretical capacity use day expected to occur during a summer week.

Vacation. An excursion away from home for outdoor recreation purposes and assumed to last more than a weekend.

Water and Related Land. Water areas are lakes, ponds, streams, and impoundments which occur naturally or artificially; related lands are those areas considered necessary for optimum development, preservation, and enhancement of the recreation and aesthetic potential of water areas.

Zone of Program Influence. (Zone of Influence). See recreation market area.

Part II General Description.

A. The Genesee River Basin.

The Genesee River Basin covers 2,479 square miles, mostly in western New York, with a small area of 96 square miles in northern Pennsylvania. The basin is pear shaped, extending 40 miles east to west and about 100 miles north to south. The Genesee River flows generally northward, approximately 160 miles, from its source in Potter County, Pennsylvania, to Lake Ontario at Rochester, New York. It is one of few north flowing rivers in northeast United States, and the only river in New York that traverses the state. (See Figure 2).

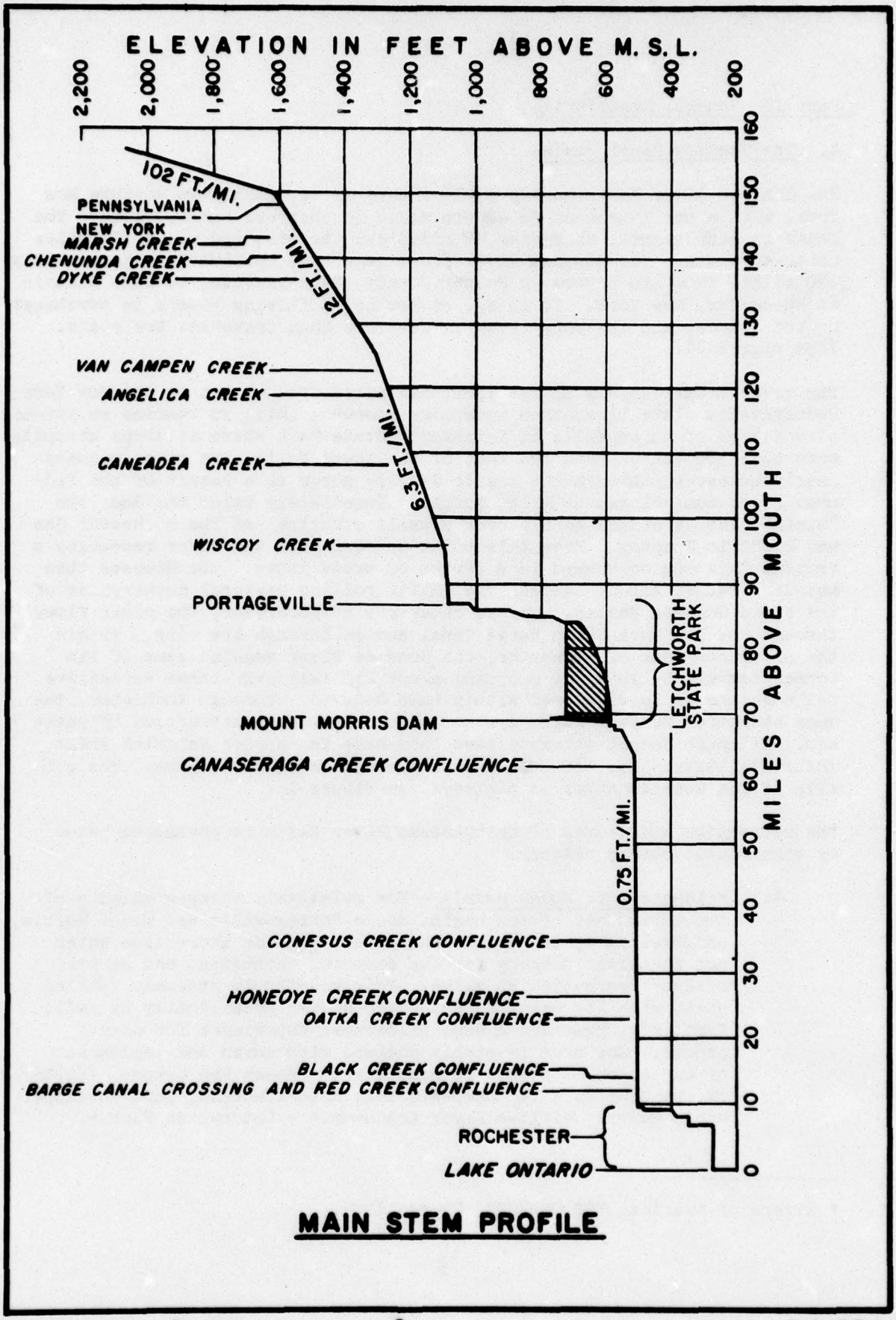
The river drops rapidly in its first few miles from origin to the New York-Pennsylvania state line, then moderates somewhat until it reaches an attractive series of three falls at Letchworth State Park where it drops abruptly more than 300 feet. From the foot of the lower falls, the river becomes nearly quiescent through the scenic Genesee gorge as a result of the Federal flood control dam at Mount Morris. Immediately below the dam, the "tamed" Genesee nudges gently over a small structure of the Rochester Gas and Electric Company. From this point to near Avon the river resembles a serpent twisting northward in a series of oxbow loops. The Genesee then meanders rather slowly through the gently rolling pastoral countryside of the broad Genesee Valley. On the outskirts of Rochester, the river flows through the New York State Barge Canal and on through the city. Within the urban corridor of Rochester, the Genesee River regains some of its former torrent by suddenly dropping about 250 feet over three successive falls before it is enveloped within Lake Ontario. Through Rochester, the once beautiful Genesee Falls are no longer the scenic attraction of years ago. Although recent attempts have been made to improve selected areas, industrialization has had its adverse effects on scenic values. The profile of the Genesee River is portrayed in Figure 1.

The recreation attributes of the Genesee River Basin is presented below by significant stream reaches.

(1) Headwaters to Mount Morris - The relatively steep gradients of the upper half of the basin, above Portageville and Mount Morris, and several of its main tributaries, provide attractive water and excellent scenery for the canoeing enthusiast and general outdoor recreationist alike. This relatively sparsely settled area, with its heavy forest cover broken occasionally by small farmlands, provides a semi-wilderness experience for most people. The area is richly endowed with names and landmarks of our colonial past. To name a few: Moses Van Campen, fighter of the Senecas - Van Campen Creek; Robert Morris, land developer - Mount Morris; William Pryor Letchworth - Letchworth Park.*

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* Rivers of America, THE GENESEE, Clune, 1963.



MAIN STEM PROFILE

FIGURE 1

(2) Lower Basin - The lower basin, from Mt. Morris to the outskirts of Rochester, with its larger percentage of farmland and gentle topography, offers a pastoral setting for more diversified recreational pursuits, including development of farm-oriented enterprises.

(3) Rochester Area - The section in the vicinity of Rochester, and the Barge Canal is typical of many other areas of the United States where industrialization has received primary consideration. Railroad yards and waste disposal have thus far counteracted most efforts of scenic preservation. However, the city of Rochester has recently set in motion their community beautification plan, a major thrust of which is to improve the Genesee River Corridor.

Water quality of the Genesee follows a pattern generally similar to the above discussed sections. Quality is fairly good from the headwaters to the Falls at Letchworth State Park. The stretch from the park to Rochester is polluted by salts, cannery wastes, and sewerage, and is rated mostly Class C according to New York State standards. Bathing is not recommended in Class C waters. It should also be noted that severe fish kills have been recorded in the lower basin area. The Genesee River is extremely polluted below the Falls at Rochester to its confluence with Lake Ontario.

B. The Recreation Market Area.

The delineation of the recreation market area is the initial and perhaps most critical step toward determining whether or not there is a need to provide additional outdoor recreation opportunity in a basin. The market area of a recreation resource contains a population whose characteristics are indicative of current and future trends in the desire to participate in recreation activities.

The recreation market area of the Genesee River Basin is composed of 18 counties (14 in New York and 4 in Pennsylvania) as outlined in Figure 2. For planning purposes, the counties contained within the market area were grouped into recreation subareas. The subareas, together with their constituent counties, are presented in Table 1. (See also Figure 2).

TABLE 1. - Recreation Subareas and Included Counties of the Genesee River Basin Market Area (New York and Pennsylvania).

Metropolitan	Barge Canal	Central Plains	Allegany Plateau
Erie	Orleans*	Genesee*	Allegany*
Monroe*	Wayne*	Livingston*	Cattaraugus*
Niagara		Ontario*	Chautauqua
		Wyoming*	Steuben*
		Yates	McKean (Pa.)
			Potter (Pa.)*
			Tioga (Pa.)
			Warren (Pa.)

* Counties considered in Genesee Basin

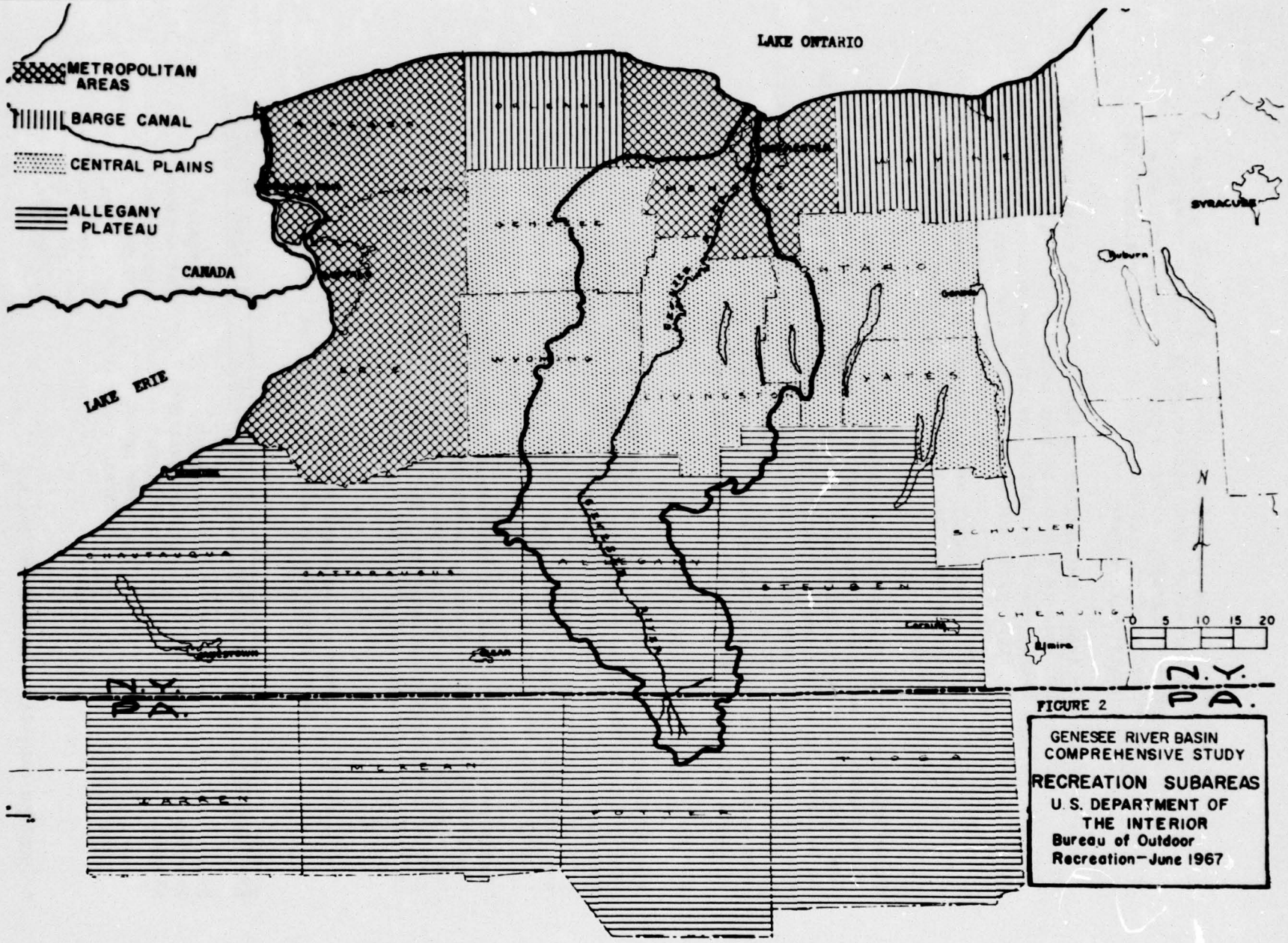


FIGURE 2

GENESEE RIVER BASIN
COMPREHENSIVE STUDY

RECREATION SUBAREAS

U. S. DEPARTMENT OF
THE INTERIOR
Bureau of Outdoor
Recreation—June 1967

(1) Physical Description.

THE METROPOLITAN SUBAREA

This subarea consists of two Standard Metropolitan Statistical Areas, Buffalo and Rochester. These two are the second and third largest cities in New York. The Buffalo SMSA also contains the city of Niagara Falls (Niagara County).

The Metropolitan Subarea is predominantly urban in character as evidenced by tall buildings, large manufacturing plants, extensive railroad yards, and modern expressways. The urban cores of Buffalo, Niagara Falls, and Rochester are continuing to disperse into nearby suburban developments and interconnected smaller communities within greater Erie, Niagara, and Monroe Counties.

The cities of Buffalo, Niagara Falls and Rochester are situated on generally level lake plains. The interior of the SMSA counties are gently rolling agricultural areas. While the Metropolitan Subareas are the heavily industrialized segments of the Genesee River Basin recreation market area, they also contain some unique physical features. Southern Erie County borders the picturesque Cattaraugus Creek gorge; the western edge borders Lake Erie. Niagara County contains the internationally famous Niagara Falls. The northern edge of the county borders picturesque and often turbulent Lake Ontario. Although not a physical feature, it is somewhat of a contrast to note that metropolitan Niagara County also contains the Tuscarora Indian Reservation.

Monroe County borders Lake Ontario and also contains a scenically significant escarpment which results in three falls of the Genesee River within Rochester.

THE BARGE CANAL SUBAREA

This subarea consists of Wayne and Orleans Counties, New York. Both counties border Lake Ontario, and both border Monroe County--Wayne to the east, Orleans to the west. Both counties are predominantly agricultural now, characterized by extensive orchards. Both counties contain unique geologic features (drumlins) along Lake Ontario. And, both counties are traversed by the New York State Barge Canal. Wayne County contains many bog or marsh areas of wildlife and botanical interest. Orleans County contains significant wetlands along Tonawanda Creek which are important as waterfowl areas.

THE CENTRAL PLAINS SUBAREA

The Central Plains are the agricultural belt of the market area. The Plains generally present a rolling pastoral scene with scattered woodlands on the hillsides. Most of the subarea contains dairy, small grain and truck producing farms; however, the eastern portion is famous for its vineyards and the "little finger lakes." In a physical sense, the noteworthy characteristic of the Central Plains is the gorge and three falls of the Genesee River within Letchworth State Park.

Noteworthy, too, is the extensive rock salt mine at Retsof in the mid Central Plains.

THE ALLEGANY PLATEAU SUBAREA

The Allegany Plateau Subarea is the largest of the four subareas and whose chief characteristics are mountainous terrain and low populations. Many natural features abound in the Allegany Plateau from the shores of Lake Erie, to Chautauqua Lake, to densely forested uplands and the rugged canyons of Pine Creek in Potter County, Pennsylvania. Curious rock formations and natural caves are characteristic of the central Allegany Plateau. Several of the Area's rivers are noteworthy for their canoeing opportunity not only for fast running waters at periods, but also for magnificent scenery.

The Conewango Valley is important for its prehistoric Indian mounds, and most of the Area's underlying shales were once famous for oil production.

(2) Socio-economic Characteristics

The Economic Base Study of the Genesee River Basin* did not include all counties of the recreation market area; therefore, the Erie-Niagara Basin Economic Base Study* and some data from the Susquehanna River Basin Study were utilized to complete the references for the entire market area.

The 14-county portion of the market area in New York contains 16 percent of that state's population, 75 percent of it within the metropolitan areas of Buffalo and Rochester. The 1960 population figures for the metropolitan subarea will more than double by the year 2020 and nearly double for the region as a whole. Table 2 presents population projections to the year 2020 for the market area.

TABLE 2 - Projected Populations, by Subarea, to the Year 2020.

Subareas	1960	1980	2000	2020
Metropolitan	1,893,344	2,614,700	3,118,800	3,834,000
Barge Canal	102,148	130,000	159,000	190,300
Central Plains	219,524	272,900	288,150	379,900
Allegany Plateau	490,429	605,500	684,200	763,600
Total	2,705,445	3,623,100	4,250,150	5,167,800

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* N.Y. Conservation Department, Division of Water Resources

The population of those counties considered within the Genesee Basin economic study is expected to increase from 1,127,500 in 1960 to 2,155,400 by the year 2020. Figure 3 portrays this increase graphically and shows that about two-thirds of the expected population increase is attributable to metropolitan Monroe County, also, population projection for the Barge Canal portion of the basin reflects the growth of adjacent metropolitan Monroe County.

The resource-based industries of farming, forestry, mining, and oil production are declining in the market area as a whole. Although much of the market area is devoted to small farms, income from farming has dropped and this trend is expected to continue. However, personal income for the region is increasing, and, on the average is most rapid in rural areas where residents are taking local non-farm jobs or commuting to the metropolitan areas for employment. Overall employment growth rates are highest in non-manufacturing industries, and a particularly high rate is predicted for construction.

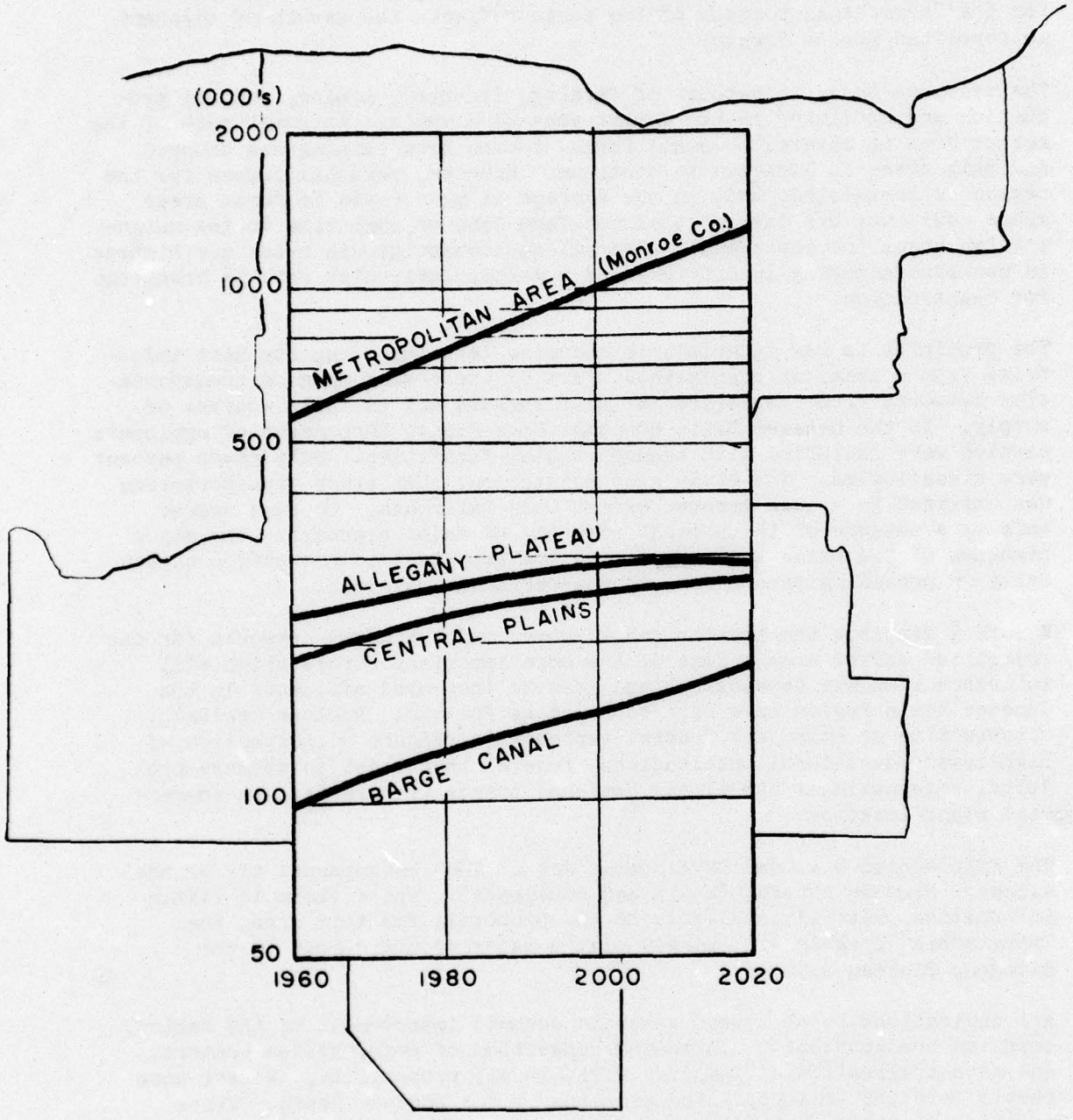
The proximity to raw materials is becoming less important for most industries from a location standpoint. Part of the reason is good transportation networks from industries to their markets and to their sources of supply. In the Genesee Basin Economic Base Study, 80 percent of employers sampled were satisfied with transportation facilities. Only seven percent were dissatisfied. The Study also pointed out that truck transportation was utilized to a much greater extent than railroads. To some degree this is a measure of the present adequacy of major highways. The major highways of the basin and market area are important to recreation especially in providing area access to non-resident travelers.

Figure 4 displays the present and proposed major highway networks for the recreation market area. Some of the more important forces which will influence economic development and lead to increased affluence in the Genesee Basin region have been reported as follows: Nuclear research, construction of state and federal expressways (Figure 4), expansion of high-level educational institutions, federal investment in defense projects, international trade, and national trends with respect to commercial plant location.

The Appalachian Regional Development Act of 1965 encompasses all of the Allegany Plateau subarea (basin and non-basin). While there is little information presently available on any proposals for this area, the "Appalachia" program will likely play a major economic role in the Allegany Plateau Subarea.

All indications point toward general economic improvement of the region. Improved transportation, increased congestion of metropolitan centers, and decentralization of industry will, in all probability, attract more people into the less populated sections of the Genesee Basin. These people will likely be a mixture of permanent and seasonal residents. In many cases they will bring with them industries which are becoming less dependent on proximity to natural resources and markets.

FIGURE 3 - Population Growth 1960 to 2020 by Subarea, Genesee River Basin Counties.*



*From Genesee River Basin Economic Base Study.

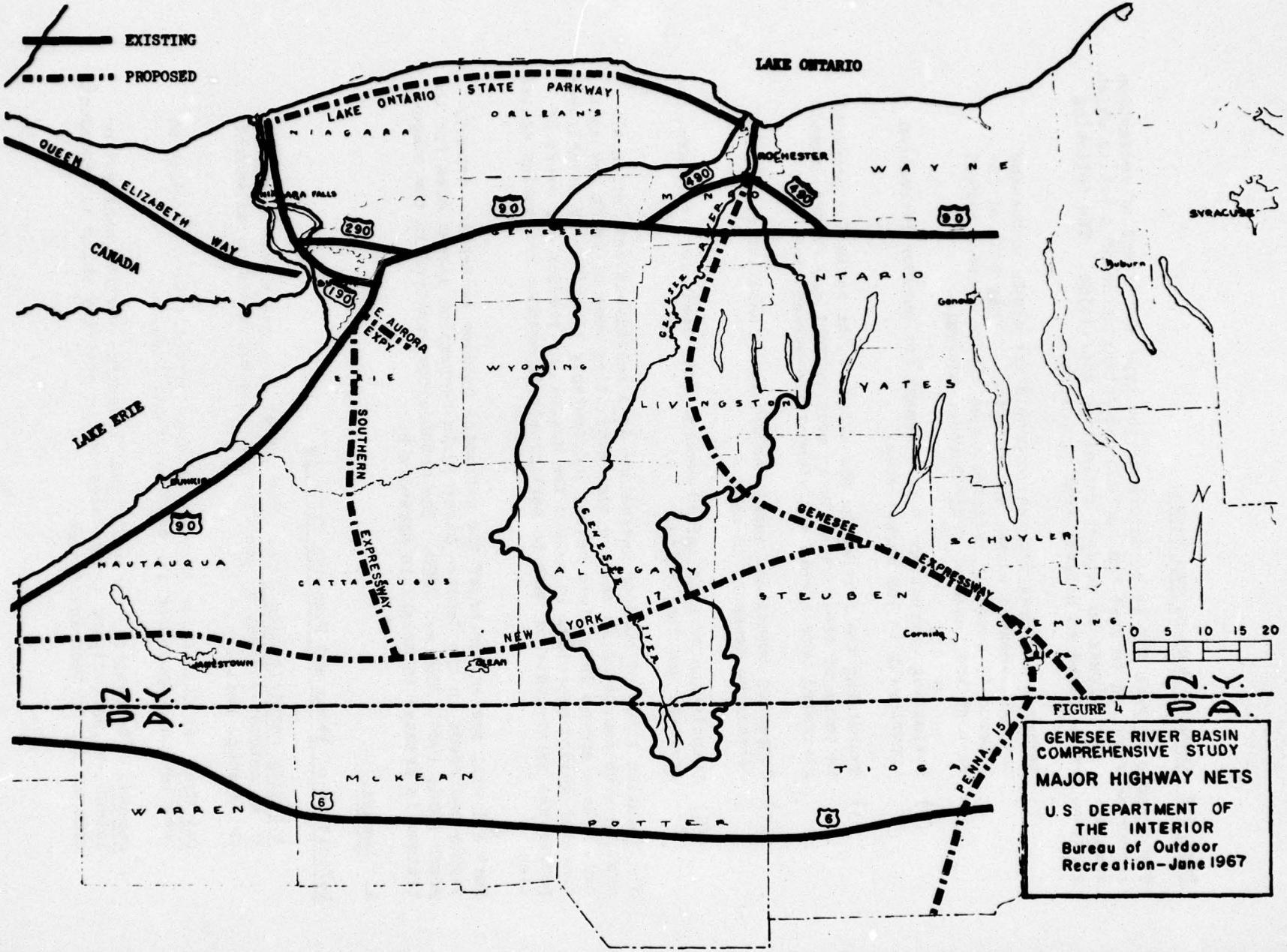


FIGURE 4

GENESEE RIVER BASIN COMPREHENSIVE STUDY

MAJOR HIGHWAY NETS

U.S DEPARTMENT OF THE INTERIOR
Bureau of Outdoor Recreation–June 1967

Part III Demand, Supply, and Needs.

The purpose of Part III is to determine the type and extent of recreation resources required to meet the current and future needs of a public which demands to participate in outdoor recreation activities. The following sections are designed to achieve that purpose by:

(1) Defining the area from which people are drawn on one-day outings, weekend trips, and vacations. This zone of influence is commonly referred to as the recreation market area of the basin or project under analysis.

(2) Estimating current and future demand for outdoor recreation opportunity in the market area.

(3) Appraising the recreation resources of the basin (or project) in terms of their capacity to meet current and future demands generated both within and without the market area.

(4) Comparing demand and supply to determine unsatisfied outdoor recreation demands, if any.

(5) Translation of unsatisfied demands into needs for resources, programs and facilities.

The detailed study of outdoor recreation is a relatively new "science" dealing with constructive leisure time activities some of which are ages old. There are no infallible texts, indisputable theories, or established computer-guided exercises to assess the demands or predict the needs of people who participate or want to participate in outdoor recreation activities.

Part III will present in brief the estimated outdoor recreation demand, supply and needs in the Genesee River Basin recreation market area for the years 1960, 1980, 2000 and 2020. The methodology employed in the computations is treated in detail in Appendix B.

A. Demand.

Definition of Terms and Planning Criteria

Activity Participation Rate. The number of times a person engages in an outdoor recreation activity; usually expressed on an annual or seasonal basis.

Day Use. An outing for purposes of outdoor recreation in which no overnight accommodation is required or utilized.

Demand. (Recreation) An individual's desire--whether manifest or latent--to participate in any pleasurable activity which is dependent upon an out-of-door environment.

Gross Demand. The resultant of multiplying a population by an activity participation rate; expressed in activity days.

Key Socio-Economic Traits. Those characteristics having significant effects upon a population's participation in outdoor recreation activities i.e. income, education, age and leisure time.

Net Resident Demand. Those outdoor recreation activity days originating and expended in the Genesee River Basin's recreation market area.

Non-Resident Demand. Those outdoor recreation activity days originating outside, but expended within the Genesee River Basin's recreation market area.

Projection Coefficients. Adjustment factors applied to ORRRC participation rates to reflect changes in socio-economic conditions.

Resident. The population residing in the recreation market area. (Non-resident - see "Non-resident demand.")

Planning Criteria*

Subarea population x seasonal activity participation rate = gross demand for activity.

Subarea Gross Demand x Use Class by activity, or:

Day Use	%
Weekend Use	%
Vacation	%

Distribute Use Classes by Travel Time Required in Market Area, or:

Day Use	%
Weekend Use	%
Vacation	%

Net Resident Demand ___

Non-resident Demand = % resident to non-resident campers ___
(include for other activities % non-resident campers who also participate in these activities)

Total of Subarea Demand = Net Resident Demand + Non-resident Demand

Projecting Demand - Projected subarea population x Projection Coefficients applied to Key Socio-Economic Traits = Projected Gross Demand.

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*See Appendix B for detailed methodology.

Demand is defined as a person's desire to participate in an outdoor recreation activity. This Section of the report presents such desire in figures for the Genesee River Basin recreation market area for the years 1960, 1980, 2000 and 2020.

Demand estimates were based largely upon adaptations of Study Reports 19 and 26 of the Outdoor Recreation Resources Review Commission (ORRRC).

Boating, camping, picnicking, and swimming, four activities which are either directly related to or enhanced by water were considered key activities since they constitute a convenient index to the type and scale of development required to accommodate the majority of water-oriented recreation uses. Estimates of demand for these four key water and related land based recreation activities were determined from:

(1) 1960 and projected populations of the recreation market area.

(2) Current and projected per capita participation rates for the resident population of the market area.

(3) Factoring this resident demand to reflect the attractiveness of the area to non-resident recreationists.

Both summer season and typical summer Sunday demand were estimated.

Total activity days demand of both residents and non-residents for the four key activities are contained in Table 3. An identified relationship between these activities allowed conversion of these demands to recreation days. Table 4 presents total estimated demand, in recreation days, for the outdoor recreation resources of the Genesee Basin's 18-county market area.

The outdoor recreation plan advocated in this report provides opportunity within the basin consistent with the apparent potential of the resources. In addition, other recreation potential outside the basin have been identified. Therefore, total market area opportunity to meet computed demand has been considered.

Demand for swimming far exceeds that for the other key activities in total (Table 3). This is not unusual since swimming is most popular among the younger age groups which make up a significant portion of the population, both nationwide and in the Genesee Basin recreation market area. Table 5 reflects the estimated percentage increases in total demand for the four activities for the period 1960-2000. In addition to nationwide and U.S. census region projections of participation rates provided by ORRRC Study Report 26, selected market area "localizing" factors were applied to demand estimates (see Appendix B, Demand Methodology). For example, it was concluded that camping opportunity at state parks in the market area attracted more non-residents than did opportunity for boating, picnicking or swimming. Further, the ratio of market area resident to non-resident campers at selected state parks was alluded to represent the total resident/non-resident demand for camping. Non-resident campers, representing

TABLE 3 - Demand by Activity for the Genesee River Basin Recreation Market Area, 1960-2020.*

	Activity Days							
	Summer Season (000s)				Typical Summer Sunday (000s)			
	1960	1980	2000	2020	1960	1980	2000	2020
Boating	3,661.1	7,470.3	12,348.5	17,003.3	112.0	219.2	362.1	491.1
Camping	702.3	2,899.6	6,283.6	10,504.8	18.0	45.9	133.0	222.6
Picnicking	7,768.5	13,363.8	19,295.9	25,529.0	238.7	411.0	593.3	785.6
Swimming	17,204.2	31,673.3	51,540.5	72,372.7	536.4	977.3	1,546.8	2,151.7

* Summarized from Appendix Table A1.

TABLE 4 - Demand in Recreation Days, for the Genesee River Basin Recreation Market Area, 1960-2020.*

	Recreation Days							
	Summer Season (000s)				Typical Summer Sunday (000s)			
	1960	1980	2000	2020	1960	1980	2000	2020
Metropolitan Areas	14,968.9	29,388.3	47,540.5	67,494.5	467.1	886.9	1,426.7	2,006.6
Barge Canal	815.4	1,479.4	2,502.6	3,445.8	25.3	44.4	74.6	101.9
Central Plains	1,753.1	3,144.4	4,535.2	6,877.8	54.3	94.5	135.5	203.4
Allegany Plateau	4,156.6	6,233.9	10,768.6	13,827.6	66.6	209.4	322.0	409.0
Market Area	21,694.0	40,246.0	65,346.9	91,645.7	613.3	1,235.2	1,958.8	2,720.9

*Summarized from Appendix Table A2.

a portion of total camping demand, are then assumed to participate in boating and swimming (not picnicking) according to locally obtained data.

TABLE 5 - Percent Increase in Total Summer Season Demand by Activity for the Periods 1960-1980, 1980-2000, Genesee River Basin Recreation Market Area.

	Increase in Activity Days	
	1960-1980	1980-2000
Boating	133%	71%
Camping	314%	117%
Picnicking	73%	45%
Swimming	84%	63%

Appendix Table A1 contains demand estimates, in activity days, for the four activities by recreation subareas.

The influence of the metropolitan subarea populations upon total demand is readily seen in Table 4. It is estimated that the metropolitan areas generated about 69 percent of total demand in 1960; by the year 2000, it is estimated that this figure will increase to 73 percent. In terms of recreation days, the metropolitan area demand of 1960 will triple by the year 2000, more than quadruple by 2020.

Economic growth rates of the area's urban centers (Buffalo, Niagara Falls, and Rochester) approximate the average forecast for the nation. Expected industrial growth and development will likely provide higher income employment; business and industrial administration will foster increased leisure time. Few will argue that a healthy economy spurs outdoor recreation demand. The problem is to judiciously anticipate its magnitude and direction.

Part III C compares outdoor recreation demand and supply in activity days to produce needs in activity days. Four key activities were selected for detailed analyses. Other activities are discussed in relation to determining total needs for outdoor recreation programs. Some of these are identified as current and future key planning elements. Key planning elements represent those activities which a public park and recreation administration or private enterprise must particularly consider in terms of:

Space
Facilities and Maintenance
Construction Technique and Cost
Access
Supporting Services

In light of the above requirements, Table 6 identifies those activities which are currently regarded as key planning activities or elements. The table also identifies those activities which through expected increases in future participation will require more consideration as key elements in public and private recreation development programs.

TABLE 6 - Classification of Outdoor Recreation Activities and Key Planning Elements Present and Future, Genesee Recreation Market Area.

I Physically Active Land Recreation

Current	Key Activities	Future	Key Activities
Outdoor Games & Sports	*	Outdoor Games & Sports	*
Golfing	*	Golfing	*
Bicycling		Bicycling	
Horseback Riding		Horseback Riding	
		Auto Racing	*
		Sky Diving	
		Motorcycling	

II Winter Sports and Recreation

Current	Key Activities	Future	Key Activities
Ice Skating		Ice Skating	
Sledding and Tobogganing		Sledding and Tobogganing	*
Snow Skiing	*	Snow Skiing	*
		Snowshoe hiking	
		Snow-mobiling	
		Ice Fishing	
		Ice Boating	
		Winter Camping	

III Water Sports and Recreation

Current	Key Activities	Future	Key Activities
Swimming	*	Swimming	*
Sailing and Canoeing		Sailing	
Boating for Pleasure	*	Canoeing	
Water Skiing		Boating for Pleasure	*
Fishing		Boat Racing	
		Water Skiing	
		Fishing	
		Fishing, Put-Take	
		Scuba Diving	
		Boat Camping	*
		Competitive Rowing	

Table 6 - Continued

IV Backwoods Recreation

Current	Key Activities	Future	Key Activities
Camping, Tent-Trailer	*	Camping, Tent-Trailer	*
Camping, Group	*	Camping, Group	*
Camping, Cabin	*	Camping, Cabin	*
Hiking on Trail		Hostels	*
Mountain Climbing		Hiking on Trail w/shelter provided	
Hunting		Mountain Climbing	
		Hunting	
		Hunting-Preserve	*
		Dog Field Trials	
		Target Shooting (Ranges)	

V Passive Outdoor Pursuits

Current	Key Activities	Future	Key Activities
Picnicking	*	Picnicking	*
Walking for pleasure		Walking for pleasure	
Nature Walks		Nature Walks	
Driving for Pleasure		Driving for Pleasure	
Sightseeing		Sightseeing	
Attending Outdoor Sports Events	*	Attending Outdoor Sports Events	*
Attending Outdoor Concerts, Drama	*	Attending Outdoor Concerts, Drama	*
		Flying for Pleasure	*
		Glider Flying	
		Sports Car Rallying	
		Viewing Nature in Centers, Preserves	*
		History Interpretation	*
		Restorative Arts Exhibitions	
		Model-hobby Exhibitions	

The criteria which determined the selection of key activities in Table 6 were the considerations from page 18 and the liklihood that one planning element or facility may be utilized for more than one activity. For example, an airfield could service pleasure flying, sky diving, model-hobby exhibition, and glider flying. A marina could accommodate pleasure boating, sailing, water skiing, scuba diving, competitive rowing, boat racing, ice skating, ice boating, and other activities.

Although golfing is an outdoor game or sport, it was listed separately as a result of the particular area and services required. The same is true for auto racing. Boat camping requires special development of islands or points on a body of water; also, extended maintenance. Preserve hunting is listed as a key activity because of near-exclusive use and the expensive requirement of rearing wildlife. Spectator sports, concerts, and drama usually require special facilities such as stadiums, arenas, and amphitheaters. Nature centers and preserves, as well as historic centers, are sites devoted to specialized and limited use - incompatible activities are forbidden.

The constraints of time and funds available for the Genesee Study necessitated only limited considerations of the activities and resources presented in Table 6. However, outdoor recreation development programs should provide opportunity for as many activities as practical by focusing upon the key planning elements.

B. Supply.

Definition of Terms and Planning Criteria

Capacity. Daily, seasonal, or annual activity days or recreation days either recorded or planned for the use of recreation areas or facilities.

Design Load. The number of people expected to occupy outdoor recreation facilities at any one time on a typical summer Sunday.

Supply. (Recreation) - Existing or anticipated outdoor recreation opportunity will satisfy a demand.

Turnover. (see Capacity) - An integer in computing capacity by which more than one person, family, or group may occupy a facility during a day.

Planning Criteria*
(Picnicking is used as an example to compute typical summer Sunday and summer season supply) Therefore:

A = persons per picnic table
B = turnover rate

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* See Appendix B for detailed methodology.

C = weekly use in capacity days
D = weeks of the summer season; hence

A x B = daily capacity per table
A x B x C x D = summer season capacity per table

Recreation resource supply is recognized as having two major forms - existing areas and those which have been programmed for completion at a future date. The supply of recreation resources was inventoried in terms of its capacity to accommodate demand for the four key activities. This provided the basis for appraising or evaluating outdoor recreation facilities, both public and private, available to meet demand. The detailed supply methodology is contained in Appendix B. Evaluations of opportunity--through facilities provided or in prospect--were made so as to make units of supply comparable to demand. Seasonal and typical summer Sunday variables were applied to the basic facility data in order to derive an estimated measure of capacities.

Potential is a term commonly associated with recreation supply. It represents an identified capability of resources to be developed for recreation; hence, the provision of facilities at an assumed level of intensity. In this report, potential recreation resources of the Genesee River Basin recreation market area are assessed and evaluated in the outdoor recreation plan - Part V.

The actual inventory of facilities and opportunity was accomplished in three pahses: Phase I - major public supply, Phase II - private sector, and Phase III - municipal supply. Phase I was an inventory and evaluation of outdoor recreation resources under the administration of federal, state, county or municipal forms of government. Data for this phase was largely obtained from the Bureau of Outdoor Recreation's Nationwide Plan Inventory and from material provided by the Genesee Park Commission.

Appendix Table A3 contains a list of the recreation areas and sites inventoried in Phase I. The table also contains an evaluation of each site in terms of summer season capacity, 1960 and 1980. The location of Phase I areas and sites are displayed in Figure 5. The key to this map accompanies Figure 5.

Phase II of the supply inventory was concerned with the private sector and consists primarily of an evaluation of private campgrounds in the recreation market area. Appendix Table A4 contains this inventory and evaluation. Other private sector supply inventoried, but not evaluated, included golf courses, natural history areas and organizations, and winter sports areas (see Appendix Tables A5, A6, and A7).

Phase III of the supply inventory was largely obtained from Volume 2 of the New York State Comprehensive Outdoor Recreation Plan. This volume contained an inventory of municipal, town, and village outdoor recreation areas and facilities in the New York portion of the Genesee market area. The evaluation of these resources is in Appendix Table A8. Miscellaneous information on county park systems of New York and county-municipal systems of Pennsylvania is also contained in Appendix Table A8.

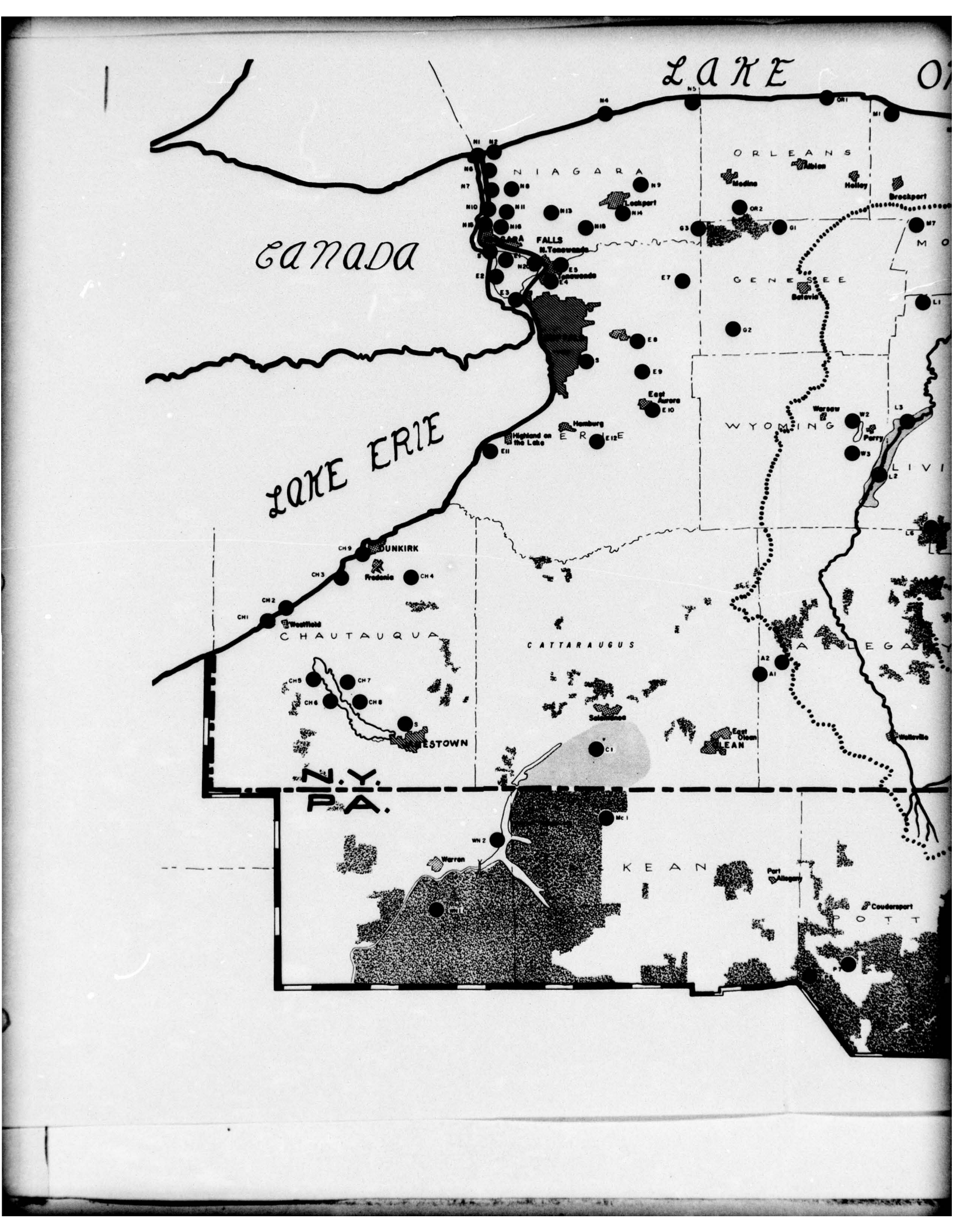
Key to Map, Phase I Supply, Major Public Areas - Genesee River Basin and Recreation Market Area.

G.M.A. - Game Management Area
B/L - Boat Launching

Index No.	County (N.Y.)	Level of Administration	Name of Area
A 1	Allegany	State	Cuba Reservation State Park
A 2	"	"	Hanging Bog G.M.A.
C 3	Cattaraugus	"	Allegany State Park
CH 2-1	Chautauqua	"	Barcelona B/L (Undev.)(Barcelona Harbor)
CH 8	"	"	Bemus Point B/L Site
CH 4	"	"	Canadaway Creek G.M.A.
CH 6	"	"	Chautauqua Fish Hatchery
CH 9	"	"	Dunkirk B/L Site
CH 3	"	"	Lake Erie State Park
CH 7	"	"	Long Pt. on Lake Chautauqua (Undev.) State Park
CH 5	"	"	Prendergast Pt. B/L Site (Undev.)
Summary	"	Local	Jamestown (Summary)
		"	Allen Park
		"	Bergman Park
		"	Jones Park
E 3	Erie	State	Beaver Island State Park
E 1	"	"	Buckhorn Island State Park
E 11	"	"	Evangola State Park
E 2	"	"	Big Six-Mile Creek Boat Basin
E 7	"	County	Akron Falls County Park
E 12	"	"	Chestnut Ridge County Park
E 8	"	"	Como Lake County Park
E 5	"	"	Ellicott Creek County Park
E 9	"	"	Elma Meadows Co. Park & Golf Course
E 10	"	"	Emery County Park
E 4	"	"	Isle View County Park
Summary	"	Local	Buffalo (Summary)
		"	Casenovia Park
		"	Delaware Park
		"	Front Park
		"	Grover Cleveland Park
		"	Houghton Park
		"	Humboldt Park
		"	LaSalle Park
		"	Riverside Park
		"	Schiller Park
		"	South Park
		"	Squaw Island Dump Site (Potential)
J 2	Genesee	State	Darien Lakes State Park (Undev.)
J 1	"	"	Oak Orchard G.M.A.
J 3	"	"	Tonawanda G.M.A.
L 1	Livingston	State	Caledonia Fish Hatchery
L 5	"	"	Conesus Lake B/L Site
L 2-(3)	"	"	Letchworth State Park (Mt. Morris Dam)
L 6	"	"	Rattlesnake Hill G.M.A.
M 1	Monroe	"	Hamlin Beach State Park
M 3	"	"	Braddock Bay State Park
M 11	"	"	Bushnell Basin Multiple Use Area
M 7	"	County	Churchville County Park
M 5	"	"	Durand-Eastman County Park
M 10	"	"	Ellison County Park
M 8	"	"	Genesee Valley County Park (East)
M 13	"	"	Highland County Park
M 9	"	"	Mendon Ponds County Park
M 4	"	"	Ontario Beach County Park
M 12	"	"	Powder Mill County Park
M 14	"	"	Seneca County Park
M 6	"	"	Webster Beach County Park
Summary		Local	Rochester (Summary)
		"	Edgerton Park
		"	Genesee Valley Park (West)
		"	Maplewood Park
		"	Tryon Park (Undev.)
N 10	Niagara	State	Devil's Hole State Park
N 1	"	"	Fort Niagara State Park (Undev.)
N 2	"	"	Fort Niagara State Park 4-Mile Annex
N 3	"	"	Golden Mill State Park (Undev.)
N 11	"	"	Lewiston State Park
N 6	"	"	Lower Niagara State Park (Undev.)
N 16	"	"	Niagara Reservation State Park
N 20	"	"	North Tonawanda B/L Site
N 7	"	"	Reservoir State Park
N 8	"	"	Wilson-Tuscarora State Park (Undev.)
N 15	"	"	Whirlpool State Park
N 9	"	County	Canal East County Park (Undev.)
N 18	"	"	Canal West County Park
N 4	"	"	Krull County Park
N 13	"	"	Oppenheim County Park
N 14	"	"	Niagara County Golf Course
Summary	"	Local	Niagara Falls (Summary)
		"	Center Court Park
		"	Griffon Park
		"	Hyde Park
		"	Jayne Park
O 1	Ontario	State	Canandaigua Lake B/L Site
O 3	"	"	Harriet Spencer Mem'l Recre. Area
O 4	"	"	Honeoye Lake B/L Site
O 7	"	"	Naples Creek Recre. Area (Undev.)
O 6	"	County	Ontario County Park
OR 2	Orleans	Federal	Iroquois Nat'l Wildlife Refuge
OR 1	"	State	Lakeside Beach State Park (Undev.)
ST 2	Steuben	State	Bath Fish Hatchery
ST 5	"	"	Erwin G.M.A.
ST 1	"	"	Stony Brook State Park
ST 3	"	County	Almond Reservoir
WA 1	Wayne	State	Chimney Bluffs State Park (Undev.)
WA 2	"	"	Wayne County Wetlands
W 2	Wyoming	State	Silver Lake Recreation Area (Undev.)
W 3	"	"	Silver Lake State Park
Y 2	Yates	State	High Tor G.M.A.
Y 5	"	"	Keuka Lake B/L Site
Y 4	"	"	Keuka Lake State Park (Undev.)
Y 1	"	"	South Hill M. U. Area
	County (Penna.)		
Mc 1	McKean	Federal	Allegheny National Forest
P 3	Potter	State	Denton Hill State Park
P 5	"	"	Lyman Run State Park
P 8	"	"	Ole Bull State Park
P 6	"	"	Sizerville State Park
P 7	"	"	Susquehannock State Forest
T 1	Tioga	State	Colton Point State Park
T 4	"	"	Hills Creek State Park
T 2	"	"	Leonard Harrison State Park
T 3	"	*	Tioga-Hammond Reservoir
T 5	"	State	Tioga State Forest
WN 1	Warren	State	Chapman Dam State Park
WN 2	"	**	Kinzua Dam
			Corps of Engineers
			U.S. Forest Service
			Concession
			Private Sector

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* Administering Agency Unknown
**Accumulation of Agencies


LAKE
CANADA
LAKE ERIE
ORLEANS
NIAGARA
GENESEE
WYOMING
CHAUTAUQUA
CATTARAUGUS
FALLS
Medina
Holley
Brockport
Batavia
Warsaw
Perry
Dunkirk
Fredonia
Westfield
Lockport
Salamanca
Warren
Port Allegany
Coudersport
N.Y.
PA.

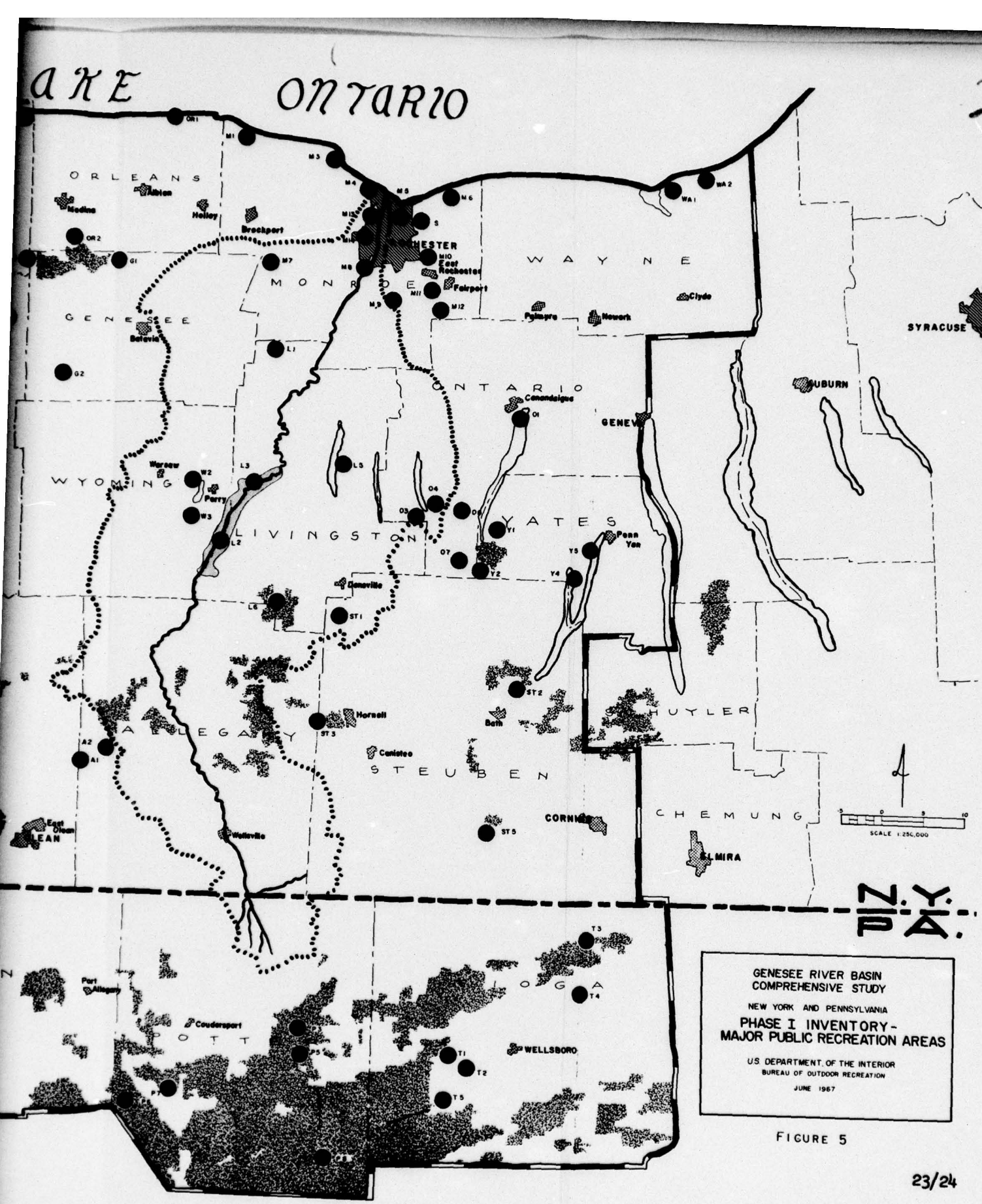

AKE ONTARIO
ORLEANS
Albion
Medina
Holley
Brockport
OR1
OR2
M1
M3
M4
M5
M6
M7
M8
M9
M10
M11
M12
S
WA1
WA2
WAYNE
MONROE
Rochester
Fairport
Clyde
Palmyra
Newark
GENESEE
Batavia
G1
G2
L1
SYRACUSE
AUBURN
ONTARIO
Canandaigua
O1
GENEVA
WYOMING
Warsaw
Perry
W1
W2
W3
L3
L5
O4
O3
O5
Y1
YATES
Penn Yan
Y5
Y4
LIVINGSTON
L2
O7
Y2
Geneseo
L6
ST1
ALLEGANY
Hornell
ST3
ST2
Bath
TIOGA
HUYLER
Canisteo
STEUBEN
A2
A1
East Olean
OLEAN
Wellsville
CORNING
ST5
CHEMUNG
ELMIRA
SCALE 1:250,000
N.Y.
PA.
Port Allegany
Coudersport
POTTER
WELLSBORO
T3
T4
T1
T2
T5
GENESEE RIVER BASIN
COMPREHENSIVE STUDY
NEW YORK AND PENNSYLVANIA
PHASE I INVENTORY-
MAJOR PUBLIC RECREATION AREAS
U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF OUTDOOR RECREATION
JUNE 1967

FIGURE 5

Considerable inventory material not necessarily dealing with the four key activities was compiled during study of the Genesee River Basin. This material, entitled, "Attributes and Attractions of the Genesee Recreation Market Area," is contained in Appendix Tables A9 and A10.

Programmed public outdoor recreation acquisitions and developments were evaluated in the same manner as existing supply, and were presumed to be accomplished by 1980. However, the computed capacity of these facilities was adjusted to accommodate increased usage and "plant efficiency" expected to result from changes in leisure patterns as reported in ORRRC Study Report 26. Further, projections of supply to 2000 and the year 2020 for the summer season contained only an adjustment factor for increased leisure time. Typical summer Sunday supply estimates for 2000 and 2020 were the same as that for 1980 since the daily capacity of facilities remained unchanged. Therefore, seasonal and typical summer Sunday supply estimates for 1980 provide the key to a more realistic demand-supply comparison than do those comparisons for 2000 and 2020.

Tables 7 and 8 present the market area supply data in terms of summer season and typical summer Sunday capacities for the four key activities, in terms of activity days, and for the four recreation subareas in terms of recreation days.

It is readily discernable from examination of Table 8 that the metropolitan subarea will offer the most computed supply (in terms of recreation days) by 1980, 2000 and 2020. At the present time, there are in addition to state parks, many county and urban parks within the metropolitan subarea. None of the other market area counties or communities have such extensive park and recreation systems.

The Allegany Plateau is the largest recreation subarea of the four, but it is not size alone that contributes to its second position in recreation days of supply. This subarea contains two extensive resource areas - the Allegheny National Forest, including Allegheny Reservoir, and New York's Allegany State Park.

TABLE 7 - Supply by Activity for the Genesee River Basin Recreation Market Area.*

	Activity Days							
	Summer Season (000s)				Typical Summer Sunday (000s)			
	1960	1980	2000	2020	1960	1980	2000	2020
Boat	251.4	1,794.8	2,256.0	2,820.0	6.5	40.2	40.2	40.2
Camp	361.8	2,396.3	2,995.3	3,744.1	5.7	33.3	33.3	33.3
Picnic	5,030.9	13,910.5	17,387.9	21,734.9	129.5	310.5	310.5	310.5
Swim	7,129.2	21,566.0	26,957.5	33,696.9	137.0	520.8	520.8	520.8

*Summarized from Appendix Tables A3, A4, A8, and A11.

TABLE 8 - Supply in Recreation Days for the Genesee River Basin Recreation Market Area.*

	Recreation Days					
	Summer Season (000s)			Typical Summer Sunday (000s)		
	1980	2000	2020	1980	2000	2020
Metropolitan Areas	17,429.4	21,786.7	27,233.4	420.9	421.0	421.0
Barge Canal	1,443.3	1,707.3	2,255.1	34.2	34.2	34.2
Central Plains	2,239.7	2,799.9	3,499.9	53.8	53.8	53.8
Allegany Plateau	5,229.9	6,537.3	8,171.6	125.5	125.6	125.6
Market Area	26,342.3	32,831.2	41,160.0	634.4	634.6	634.6

*Summarized from Appendix Table A2.

C. Needs.

Definition of Terms.

Needs. (Recreation) - Units of water, land and facilities required to meet demand for outdoor recreation activities. Needs are also unsatisfied demands which result from a comparison of demand with supply (where estimated demands do indeed exceed supply).

Planning Criteria*

Key activities - typical summer Sunday design load

Demand - Supply = Needs (unsatisfied demand in activity days)

Boating - $\frac{\text{Needed Activity Days}}{\text{Persons per Boat x Turnover}}$ = Boats
Boats x surface acres per boat = surface acres of water

Camping - $\frac{\text{Needed Activity Days}}{\text{Persons per Camp site}}$ = Campsites
Campsites per acre = developed camping acres of land

Picnicking - $\frac{\text{Needed Activity Days}}{\text{Persons per Table x Turnover}}$ = Tables
Tables per Acre = developed picnic acres of land

Swimming - $\frac{\text{Needed Activity Days x 70\% swimmers on beach}}{\frac{43{,}560 \text{ Ft.}^2}{50 \text{ Ft.}^2 \text{ per person}} \text{ x Turnover}}$ = Acres beach

Several examples of unsatisfied outdoor recreation demand may assist in comprehending needs as ultimately reflected in estimates of acres of water and land required to fulfill these needs. Examples are: (1) "turn-away" of prospective visitors as a result of already occupied facilities; (2) lack of existing opportunity to participate in a desired activity; and (3) restrictions imposed upon a prospective participant, e.g. "no motorboating allowed."

Estimated outdoor recreation needs, in terms of activity days and recreation days are respectively presented in Tables 9 and 10. It was concluded that 1980 was the year for which a critical assessment of needs should be made in order to determine the acres of land and water required to fulfill those needs. This conclusion was reached because (1) presently known public and private recreation programs and proposals can reasonably be expected to materialize by 1980; and (2) demand and supply projections tend to be more reliable for the period 1960-80 than for 1980 to 2000 or 2020. Therefore,

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* See Appendix B for detailed methodology.

the satisfaction of needs in 1980 is the principal objective of the outdoor recreation plan for the Genesee River Basin.

TABLE 9 - Needs by Activity for the Genesee River Basin Recreation Market Area, 1960-2020.*

	Activity Days							
	Summer Season (000s)				Typical Summer Sunday (000s)			
	1960	1980	2000	2020	1960	1980	2000	2020
Boating	3,409.7	5,675.5	10,092.5	14,183.3	105.5	179.0	321.9	450.9
Camping	340.5	503.3	3,288.3	6,760.7	12.3	12.6	99.7	189.3
Picnicking	2,737.6	(546.7)**	1,908.0	3,794.0	109.2	100.5	282.6	475.1
Swimming	10,075.0	10,107.3	24,583.0	38,676.6	399.4	456.5	1,026.0	1,630.9

* Summary from Appendix Table A11
**Supply exceeds demand

TABLE 10 - Needs in Recreation Days for the Genesee River Basin Market Area, 1960-2020.*

	Recreation Days							
	Summer Season (000s)				Typical Summer Sunday (000s)			
	1960	1980	2000	2020	1960	1980	2000	2020
Metro Areas	8,614.2	11,958.9	25,753.8	40,261.1	344.9	466.0	1,005.7	1,585.6
Barge Canal	814.7	36.2	698.5	1,190.7	25.3	10.2	40.4	67.7
Central Plains	1,560.2	904.7	1,735.3	3,377.9	50.2	40.7	81.7	149.6
Allegany Plateau	2,067.9	1,004.0	4,231.3	5,656.0	26.2	83.9	196.4	283.4
Market Area	13,057.1	13,903.8	32,418.9	50,485.7	446.6	600.8	1,324.2	2,086.3

*Summary from Appendix Table A2

A narrative evaluation of outdoor recreation needs by key activity, follows:

Boating. That boating opportunity, based on projected supply (1980), should be the lowest of the four key activities may seem somewhat unusual in view of Lakes Erie, Ontario, Chautauqua, and Canandaigua. Nevertheless, the supply information verifys that there is a lack of boating opportunity in the market area. Lack of access, pollution, frequent high winds on the Great Lakes, and other conditions have limited boating use - a fact further reflected in the region's lowest boat/person ratio of New York State.

Some private and public boat launching and marina facilities were undoubtedly overlooked during the inventory. It was assumed, however, that assessed opportunity in these areas would not have resulted in a significant reduction of overall boating needs in the Genesee Basin's recreation market area.

Camping. Many public and private areas either offer now or anticipate offering tent and trailer camping opportunity by 1980. (See Appendix A, Tables A3,4 & 8). The Genesee Park Commission states that campgrounds in its region receive more than capacity use in the summer especially on weekends and holidays. The time-honored attraction of the Genesee gorge and falls, plus reasonable rates, make Letchworth State Park an outdoor recreation magnet (see Figure 6).

Also, camping facilities in Letchworth State Park are outstanding. As a result, existing and programmed campsites at the Park can be expected to show continued capacity use and turn-away. Other publicly-administered parks whose facilities and attractiveness are similar to Letchworth can also expect more than capacity use. Likely, a fewer number of public campsites attempt to fulfill the greater portion of demand.

Overflow of public park campgrounds is one reason for the significant increase in the number of private campgrounds in the market area whose first year of operation was 1964 versus those operating prior to that time. (Appendix Table A4). Other reasons are conversion of retired agricultural land to campsites, and the publicity of current camping demands.

Variety, quality, accessibility, and reasonable rates are necessary complements of recreational enterprises. Those private campgrounds offering the better facilities and services are likely to survive. With rising costs of material and maintenance, this may be difficult, especially when a reasonable return often means charging rates above those of publicly-administered parks. One must also consider business survival during lean periods and the need for additional capital. Trends in the est blishment and continuance of private campgrounds indicate that long-term survival is not high. Further, that private campgrounds often find it difficult to "compete" with publicly operated areas. This effect on the inventoried camping supply of private areas is reflected in Appendix Table A11.

Camping needs are demonstrated for both the seasonal and typical summer Sunday for the years 1980 to 2020. It is assumed that most of these needs will be met by public areas.



FIGURE 6 - Middle Falls, Genesee River, Letchworth State Park
(Photo courtesy Genesee Park Commission)

Picnicking. It is interesting to note that in 1980 there are picnicking needs for a typical summer Sunday while seasonally there is an excess of supply. However, by the years 2000 and 2020, there are picnicking needs both for the season as well as the typical summer Sunday. This, of course, illustrates the disparity which can occur between a constant supply and variable demand which is exerted primarily on weekends.

Picnicking, as a distinct and separable activity, takes many forms. Much of this activity is reflected in simply picnicking on the ground in almost any available area, at roadside rest areas, small state forest picnic sites, streamsides, and many others. As such, it is assumed that about 75 percent of picnicking opportunity was inventoried. Therefore, 1980 total programmed picnicking supply was adjusted upward by 25 percent.

Swimming. Much of the same may be said for swimming opportunity as picnicking. Undeveloped lakeshores, streamsides, and farm ponds are utilized for swimming. Also, the inventory of community pools is very likely incomplete. Therefore, it is assumed that swimming opportunity, like picnicking, was underestimated, and prospective 1980 swimming supply was revised upward by 25 percent (See Appendix Table A11).

Table 11 indicates the percent of demand fulfilled on a typical summer Sunday (demand to supply ratio). Meeting the needs on a capacity day in 1980 is the principal objective of the recommended plan for recreation resource development, enhancement, and preservation.

TABLE 11 - Anticipated Activity Days Need Fulfilled on a Typical Summer Sunday, 1980, with Addition of Programmed Supply, Genesee River Basin Recreation Market Area.*

	Boat	Camp	Picnic	Swim
		(%)		
Metropolitan Areas	14	30	64	47
Barge Canal	83	162	92	76
Central Plains	23	243	152	64
Allegany Plateau	21	158	85	69
Market Area	18	73	76	53

*From Appendix Table A11.

Analysis of Recreation Subareas. The following paragraphs discuss needs within the recreation subareas. Certain observations and conclusions on each subarea's potential for development are also discussed.

The same development standards used to evaluate current supply will be applied later to potential outdoor recreation resources in order to estimate resource requirements in terms of the acres of developed lands and waters to meet recreation needs. However, standards are often colorless, and mathematical conclusions fail to recognize individual characteristics of the areas and communities for which they were drawn. It is intended that the remainder of the needs section will provide a sufficient background of subarea color to flavor the suggested recreation developments in Part V, Outdoor Recreation Plan.

THE METROPOLITAN SUBAREA

The metropolitan counties of Erie, Monroe, and Niagara have many assets to attract the recreationist,* but perhaps the most significant attraction is the internationally famous Niagara Falls. Table 11 emphatically demonstrates that the metropolitan subarea shows the greatest needs in 1980 for the key activities. It should be noted, however, that the urban counties also produce a substantial amount of the opportunity expected by 1980. Surplus opportunity indicated for some activities in other subareas considers only their proportionate share of resident/non-resident demand. In most cases market area needs reflect at least a portion of the urban impact.

In spite of Lakes Erie and Ontario, the metropolitan areas are lacking opportunity for boating and swimming. Camping needs, too, are extensive. In fact, while all other subareas contain at least some camping surpluses, the impact of the urban areas is sufficient to conclude that the market area has need for camping opportunity by 1980.

Park and recreation systems in the metropolitan area have vigorous acquisition and development programs some of which are supported by BOR Grants-in-Aid. Many urban counties and communities have utilized local comprehensive plans prepared by themselves or by contract consultants. Probably nowhere in the market area are political subdivisions more aware of and doing more for their outdoor recreation needs than the heavily urbanized counties of Erie, Monroe, and Niagara. They have a larger tax base to draw upon than the less populated areas, but are also faced with shrinking open space, water pollution, and the ever increasing need for industrial expansion and public services.

There is a tendency in the metropolitan areas for more and more use of local facilities by residents of adjacent political subdivisions. This means, for example, that more use of Buffalo's City recreation facilities is made by greater Erie County than the city deems equitable in light of

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* See Appendix Table A9

its funding requirements and resident needs. This situation of inter-use is evident throughout Erie and Niagara Counties. For the future, widespread inter-borough use can be expected to increase. The problem is one of fair-share monetary consideration, and perhaps more importantly, a lack of coordinated planning among the various political levels to meet the needs of an indiscriminate population (in the use of facilities sense). The reality of course is suburban growth. Surely, there is a need to consider consolidation of planning and funding efforts between city, town, county, and state recreation programs in Erie and Niagara Counties which might consider an "Erie-Niagara Metropolitan Park System."

THE BARGE CANAL SUBAREA

Of the four, this subarea presents the most favorable needs picture for 1980. However, water based recreation opportunity is needed. The subarea borders Lake Ontario, but this resource is not used extensively for water based recreation. The Lake surface is frequently too rough for small boats and the water too cold for swimming. The Genesee State Park Commission plans a swimming pool at Hamlin Beach on Lake Ontario primarily because of low lake water temperature. Pleasure boating opportunities and safety could be greatly improved by provision of additional harbors of refuge on Lake Ontario.

Most of the current outdoor recreation opportunity in the Barge Canal counties is offered by the state parks. Very little private or local supply was noted. Orleans and Wayne Counties will absorb some of the growth of Buffalo, Niagara Falls, and Rochester, and future development of this subarea should consider the population increases in the metropolitan areas.

The Barge Canal subarea has significant outdoor recreation resources worthy of preservation. The New York State Barge Canal also has development potential for the four key activities. Its importance would probably be as a major avenue for pleasure watercraft. Rest stops and service facilities should be developed, and, where possible, equestrian-bicycle trails provided along the tow path. Lake Ontario State Parkway will pass through Orleans County, and will connect the several state parks along the lake. Rest stops and overlooks along the parkway would offer sightseeing and nature appreciation opportunities.

Although the Barge Canal subarea is in close proximity to the metropolitan areas and urban-oriented outdoor recreation development is indicated, preservation of the outstanding natural areas should be the foremost consideration in this subarea.

THE CENTRAL PLAINS SUBAREA

Tables 9 and 11 demonstrate that there will be considerable boating and swimming needs in the Central Plains by 1980. Also, by 1980, improved highways will place most of the subarea within one hour's travel of Rochester and Buffalo. Letchworth State Park, long the area's most notable attraction, will tend to become more and more a user rather than resource-oriented park. Because of its inaccessibility, Mt. Morris Reservoir within the state park presently provides little or no recreation opportunity. If combined with a large water resource development, Letchworth State Park would become a recreational attraction of national significance.

Canandaigua, Conesus, Honeoye, and Keuka Lakes provide water-oriented recreation opportunity, but most of their usable shorelines are in private ownership. Hemlock and Canadice Lakes offer potential that should be investigated further. The city of Rochester maintains these lakes for municipal water supply and does not allow general recreation use. Unless there are major changes in use of existing water bodies, or new impoundments are constructed, boating opportunities in the Central Plains will be inadequate to meet demands in 1980.

Much of the Central Plains is contained within the watershed of the Genesee River Basin. The Corps of Engineers and Soil Conservation Service have identified several potential reservoir sites. Detailed analysis of the recreation aspects of these sites is contained in Part V.

THE ALLEGANY PLATEAU SUBAREA

New York's Southern Tier and Pennsylvania's Grand Canyon country are richly endowed with natural outdoor recreation resources. In an area where the relative economic importance of forestry, agriculture, and petroleum is declining, outdoor recreation enterprise is offering new opportunity. Private capital is providing much of the stimulus in this subarea. New York, Pennsylvania, and Federal public areas offer highly attractive impetus - Allegany State Park, Leonard Harrison State Park, and the Allegheny National Forest.

In spite of the Kinzua project, Chautauqua Lake, and Lake Erie, the Allegany Plateau lacks sufficient accessible and useable water for recreation, especially boating.

Although small lakes abound in the area, most are devoted to exclusive use. Lake Foster, near Wellsville, is an outstanding example of natural history preservation combined with limited recreation use. Allen Lake in the Allegany State Forest offers excellent opportunity for recreation with limited facilities, and fine fishing. The Zoar Valley of Cattaraugus Creek, near Gowanda, resembles a "little Genesee" gorge replete with white water for canoeing. Ischua Creek in southern Cattaraugus County appears to be the "father and son" water for back country recreation. For a short time during the spring Pine Creek in Potter County is notable canoeing water. The main stem of the Genesee between Wellsville and Belmont is also good canoeing water for about six weeks during the spring.

Future development of the Allegany Plateau subarea should consider as much as possible the protection of the natural recreation resources for which the area is noted. The semi-wilderness flavor of the area should be preserved.

The current rapid pace of private campground development is expected to decline in the future. Nevertheless, those with an attractive location and which offer the best services, will survive and grow.

The Allegany Plateau is endowed with many unique natural and historical sites which should be preserved. Also, continued development of the Finger Lakes Trail network should be encouraged.

RESOURCE REQUIREMENTS

The resource requirements in acres of land and water needed to fulfill estimated future demands in the Genesee River Basin recreation market area are presented in Table 12. Needs in activity days on a typical summer Sunday (from Table 9) were utilized to estimate the resource requirements for 1980, 2000 and 2020. The planning criteria for each key activity formed the basis for estimating developed acres required. The estimate of total acres of land and water presented in Table 12 was based upon the assumption that the developed acres required represented only a portion of those recreation lands and waters needed in a management unit e.g. a state park. In addition, allowances were made to provide opportunity for other activities. Appendix B contains the detailed methodology.

TABLE 12 - Resource Requirements on a Typical Summer Sunday, 1980-2020, Genesee River Basin Recreation Market Area.

(Acres)

	1980		2000		2020	
Subarea	Land	Water	Land	Water	Land	Water
Metropolitan Area	10,800	68,000	66,500	121,800	168,800	171,100
Barge Canal	6,700	600	15,600	3,500	6,400	5,700
Central Plains	6,900	6,400	15,000	10,300	7,300	16,200
Allegany Plateau	7,300	14,400	20,200	25,300	24,000	32,400
Market Area	31,700	89,400	117,300	160,900	206,500	225,400

Needs Summary. If one were to place himself in any of the other recreation subareas and project the future impact on his area generated by the population of the metropolitan areas, he might conclude that: (1) demand for facilities in his area by residents of urban-suburban Erie, Monroe, and Niagara Counties would equal or exceed those of all non-residents and his subarea residents combined; (2) greatly improved travel conditions have brought the rural Central Plains and the Allegany Plateau within less than two hours travel time of the metropolitan areas; (3) the Barge Canal subarea will become virtual suburbs of Buffalo-Rochester; and (4) the greatest outdoor recreation needs demonstrated are for the water based activities--boating and swimming--in spite of the immense Lakes Erie and Ontario.

Conclusions based on needs analyses suggest that future outdoor recreation programs in the recreation subareas emphasize swimming and boating opportunity. Local park or recreation area administrations should employ the metropolitan large park or county system design which is more flexible than any other in providing opportunity. Camping should be concentrated in the Central Plains and Allegany Plateau and be provided by state and private administrations. As a result of suburban growth and shrinking open space, the resource requirements estimated for the metropolitan subarea will have to be met within the other subareas.

Locks on the Door

The Genesee River Basin has its examples where the non-sharing of planning in recreation development has posed difficulties. In an area notably lacking existing water surface areas, Rushford Lake still offers some opportunity for public use even though cottages nearly envelope the shoreline. Canadice and Hemlock Lakes, natural recreation opportunities, are managed under a virtual "hands-off" policy of the city of Rochester. Mt. Morris Reservoir is under strict public control by the Genesee Park Commission with only limited opportunity for access to the unusual and spectacular view of the Genesee gorge from below. Lakes Erie and Ontario are plagued by pollution and lack of public access issues of public and private concern.

Part IV The Private Sector - Genesee Recreation Market Area.

There are few areas in northeastern United States where more diversified outdoor recreation opportunity is provided by private enterprise than the recreation market area of the Genesee River Basin. Indian reservations, campgrounds, museums, art festivals, preserved rock formations, steam railroads, a wolf park, historic sites, boat excursions, ski slopes, golf courses, and professional football - to name a few - are available to the public. A partial inventory of some existing and proposed private outdoor recreation opportunities appears in Appendix A.

If a needs analysis of publicly-administered opportunity is difficult, a similar analysis of the private sector would be chaotic. Private enterprise is spurred to activity either by available opportunity or the willingness to provide a service. One thing is sure - there is a survival discipline among private endeavor which is dictated by public demand. Those enterprises that offer only the bare necessities of human tolerance soon disappear. Some are not able to continue their services as a result of a profitless venture, some lose interest.

The long term survival rate for private campgrounds is not considered high. However, the outlook is good for those who remain in business. Private campgrounds in the future must offer more specialized services not generally available in publicly-operated areas. Such services as baby sitting, private flying accommodations, organized group activities, winter sports, and others, will be common. Also, personalized service will not likely lose its importance.

There is difficulty in separating the private sector into service groups. Some are profit-making, some non-profit, and others are of a quasi-public endeavor endowed in part by public funds. Public recreation administrators should clearly recognize the impact of private enterprise in formulating their development plans. Many services or opportunities not available in a publicly-administered park can be effectively provided by private or quasi-public enterprise. Also, private recreation areas can be devoted to single or limited purpose activities - something not in accord with present multiple use policy on publicly-owned lands and waters. Much of the outdoor recreation development in the Allegany Plateau should be accomplished by the private sector. This would be in accordance with the character of development in an area whose physiography and population demands are not in character with the intensively developed day use recreation areas such as near Buffalo and Rochester.

Many private outdoor recreation enterprises cater to a public whose income is more than average. This is often a part of private enterprise seeking a profitable return on investment. Heated swim pools, lawn tennis, golf courses, airstrips, and the "red carpet treatment" among other niceties are inducements, no doubt.

One service that private enterprise can usually furnish is the provision of alcoholic beverages. While this service often can be obtained outside a public park, such an attraction provided on a recreation site has its appeal. It is concluded that whatever patronage is induced now is not likely to diminish in the future.

There are few subjects associated with outdoor recreation that can elicit more controversy than the question of summer or vacation homes occupying waterfront property. Some of the basic issues at hand are that private homes or development deprive the public from access to bodies of public water. Exclusive jurisdiction, real or implied, is maintained, and indiscriminate private development leads to incompatibility in public use of a water resource.

On the other hand, who among us does not dream of a cottage or vacation home on the water? Private investment and spending contributes to the local tax base and economy, generally in excess of the cost of governmental service requirements such as police and fire protection, and waste disposals. Encouragement of private investment opportunity lends support to proposals for public acquisition of lands and waters. Private home development does not have to be out-of-character with public development of a water resource. There can be some cultivated landscape beautification of shorelines which can be inspirational. One important consideration often overlooked in planning water and related land resource developments is expressed demand by private interests to share in the resource.

The solution to the private share of public resource development whether that share is for vacation homes, recreation opportunity, or profit-making services, is locally inspired and enforced zoning and building codes combined with a willingness of local authority to participate financially or spiritually in mutual assistance programs. Federal and state governmental agencies should acquaint local authorities with their plans as soon as possible, and invite them to participate in the planning process.

Part V The Outdoor Recreation Plan.

The Outdoor Recreation Plan focuses primarily upon the Genesee River Basin and upon the provision of water-oriented or water-enhanced recreation opportunity. The Plan also includes suggestions and recommendations for developments within the market area. Wherever possible, potential recreation resources of the Basin and market area are assessed to determine their optimum capability to satisfy at least a portion of the total computed needs from Part III. Primary emphasis is placed upon planning for the year 1980.

A. Appraisal of Recreation Potentials. An appraisal of the existing and prospective outdoor recreation resources of the Basin and market area in terms of activity days has been presented in Part III. Outdoor Recreation Plan Table 1* presents a digest of federal and state programmed developments expected by 1980 for the market area (from Appendix Table A3). A similar appraisal of existing outdoor recreation resources of the counties and local communities was made in Appendix Table A8. Prospective outdoor recreation resources of the counties, towns, and communities are summarized in ORP Table 2.

In spite of the opportunities indicated in ORP Table 1 to be provided by the federal and state recreation agencies, substantial needs were noted in Part III. Although a wealth of prospective opportunity for the counties and communities in the market area is disclosed in ORP Table 2, it is doubtful whether many of them will be in a position to develop their prospective resources by 1980. The availability of federal and state assistance programs will help; however, the pressures of needed new and improved local public services such as sewerage disposal improvements, schools, and streets may materially affect recreation development. These and other major problems face recreation development in the metropolitan areas. (See page 32).

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* Further reference to Outdoor Recreation Plan Tables will be abbreviated "ORP."

OUTDOOR RECREATION PLAN TABLE 1 - Federal and State Park and Recreation Systems - Significant Development by Key Activity Programmed to 1980. A Synopsis of Programming from Table A3.

County	Supply Map No.	Name	Boat	Camp	Picnic	Swim
McKean,Pa.	Mc1	Allegheny National Forest	X	X	X	X
Allegany	A1	Cuba Reservation State Park			X	
Cattaraugus	C3	Allegany State Park	X	X	X	X
Chautauqua	CH8	Bemus Pt. Boat Launching Site	X			
	CH3	Lake Erie State Park	X	X	X	X
	CH7	Long Pt. on Lake Chautauqua State Park (BOR Grant-in-Aid)	X		X	X
Erie	E3	Beaver Island State Park			X	X
	E1	Buckhorn Island State Park			X	
	E11	Evangola State Park		X	X	X
Genesee	G2	Darien Lakes State Park		X	X	X
	G3	Tonawanda Game Management Area		X	X	
Livingston	L2,3	Letchworth State Park		X	X	X
	L6	Rattlesnake Hill Game Management Area			X	
Monroe	M1	Hamlin Beach State Park (BOR Grant-in-Aid)	X	X	X	X
	M3	Braddock Bay State Park	X		X	X
Niagara	N1	Fort Niagara State Park	X		X	X
	N2	Fort Niagara State Park (4-mile Annex (BOR Grant-in-Aid)	X		X	X
	N5	Golden Hill State Park		X		X
	N6	Lower Niagara State Park			X	X
	N7	Reservoir State Park			X	X
	N8	Wilson-Tuscarora State Park	X		X	X
Ontario	O3	Harriet Spencer Mem'l. Recreation Area		X	X	
Orleans	OR1	Lakeside Beach State Park	X	X	X	X
Steuben	ST1	Stony Brook State Park		X	X	X
Wayne	WA1	Chimney Bluffs State Park	X	X	X	X
	WA2	Wayne County Wetlands	X	X	X	

County	Supply Map No.	Name	Boat	Camp	Picnic	Swim
Wyoming	W2	Silver Lake Recreation Area	X		X	
	W3	Silver Lake State Park	X		X	
Yates	Y2	High Tor Game Management Area		X		
	Y5	Keuka Lake Boat Launching Site			X	
	Y4	Keuka Lake State Park	X	X	X	X
	Y1	South Hill Multiple Use Area		X	X	
McKean, Pa.	Mc1	Mount Jewett State Park			X	
Potter	P8	Ole Bull State Park		X		
	P6	Sizerville State Park		X		
Tioga	T4	Hills Creek State Park		X		

OUTDOOR RECREATION PLAN TABLE 2 - Prospective Outdoor Recreation Resources of the Counties, Towns and Communities, Genesee River Basin Recreation Market Area.

County	Name	Potential Project or Significance
Allegany	Wellsville Village	Park on Genesee River - 50 years
Cattaraugus	Cattaraugus County	2 lakes (total 70 acres); 16 forest tracts (2000 acres) undeveloped; access to Allegheny Reservoir
	City of Olean	Allegheny River ribbon parks; access to Allegheny River
	Town of Machias	Access to several farm ponds
Chautauqua	City of Jamestown	Access to Lake Chautauqua
	City of Dunkirk	Access to Lake Erie; acquire land at Pt. Gratiot Park
	Town of Carroll	Develop 315 acre park on Conewango Creek
	Town of Pomfret	Plan to acquire 200 acre park
	Town of Fredonia	Own 44 acres of wooded land on a lake
Erie	Erie County	Add 4,655 acres in 7 new parks and conservation areas and 5 existing parks. County has 10 forest sites, 3000 total acres. Erie-Niagara Plan proposes two large resource-oriented parks (Bond's Lake and Hunter's Creek)

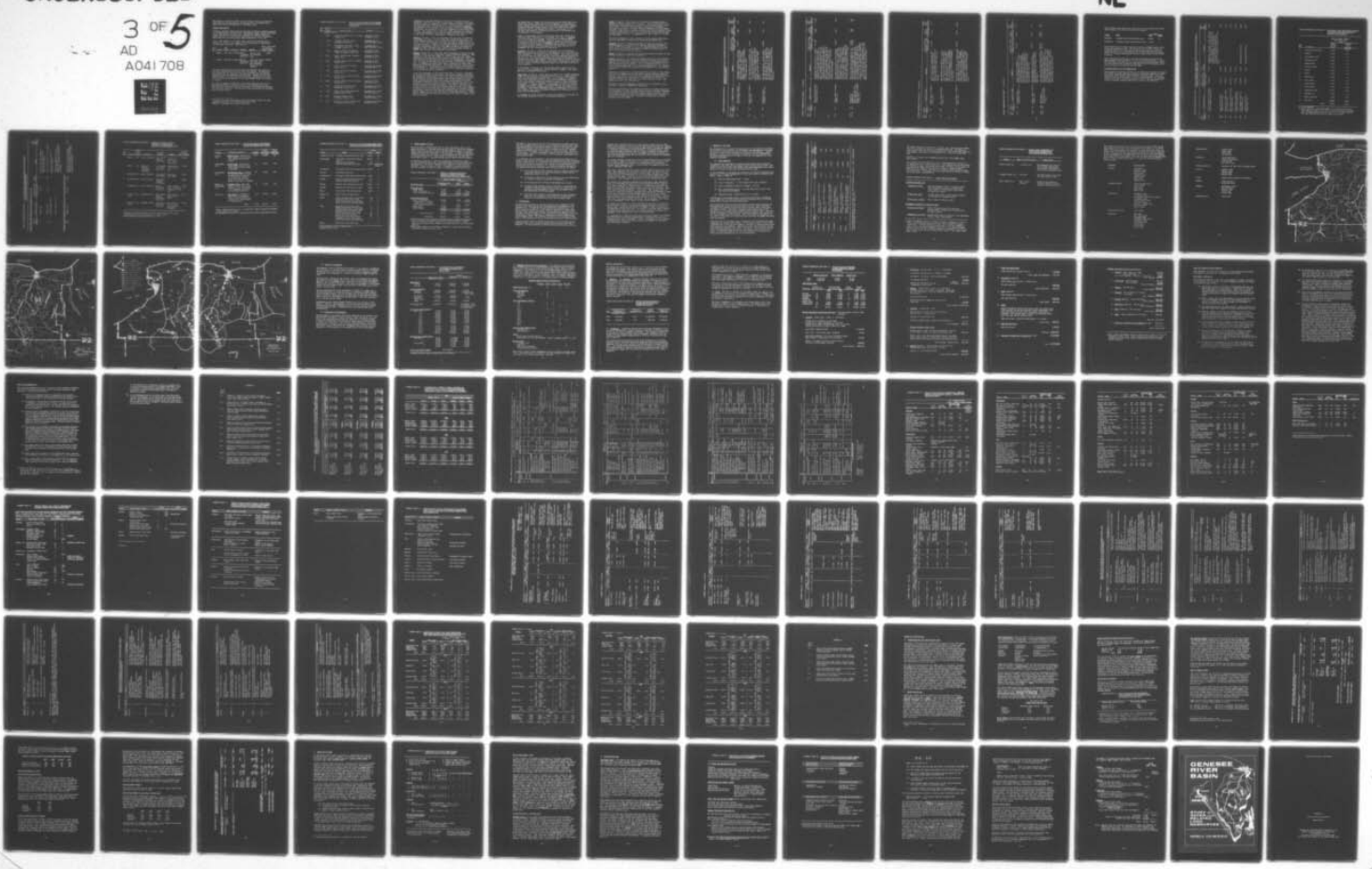
County	Name	Potential Project or Significance
Erie (Con't)	City of Buffalo	Develop Shoshone Swim Pool Complex and Ontario Street Boat Launching site. Bennett Beach on Lake Erie closed due to pollution. Times Beach awaits development
	City of Lackawanna	34 acre park on Smokes Creek
	Town of Hamburg	Acquire 350 acres park land and 13 miles of stream easements
	City of Tonawanda	Plan 20 acres of parks and 22 acres connecting parkways
	Town of Tonawanda	Has extensive community park and recreation program
	Town of Grand Island	Acquire 375 acres including 200 acres parkway along streams; preparing master plan which includes boating
	Town of Evans	Acquire 500 acres of parks and 500 acres of conservation lands
	Town of Clarence	Need funds to develop Tonawanda Creek Park, Clarence Center Park, and Swormville Park
	Town of Amherst	Oakwood and Pfohl Parks have priority for development
	Town of Lancaster	BOR Grant-in-Aid for wading pool, winter sports, Meadowles Park
Genesee	City of Batavia	Acquire 125 acres in 8 sites; may acquire 46 acres of VA hospital land
Livingston	Village of Avon	Acquire 35 acre site (with town)
Monroe	Monroe County	Expanding park systems by 70 percent (1961-66) on about 3,500 acres. Will expand 5 county parks and 3 city parks (under county operation). Will create 3 new parks; Irondequoit-125 acres; North Hampton Park-972 acres; Oatka Creek-451 acres
	City of Rochester	Establish Genesee marina and Troup-Clarissa; extend Senaca Park, Maple-wood Park; and develop Genesee Valley Park West. Plan major renovations at many interior city parks as a result of new beautification program
	Town of Greece	4 undeveloped parks, 105 acres; Develop Town Hall Park; dredge Irondequoit Creek, development on Barge Canal
	Town of Henrietta	Develop Henrietta Memorial Park
	Town of Irondequoit	Acquire 10 and 50-acre sites
	Town of Perinton	Spring Lake Park-55 acres-undeveloped; will develop Egypt Park
	Town of Webster	BOR Grant-in-Aid for 850 acres Schlegal Park

County	Name	Potential Project or Significance
Niagara	Niagara County	Developing Niagara County Escarpment Park; will develop areas on Barge Canal. Boating areas possible on Lake Ontario
	Niagara Falls	Develop Robert Moses Parkway and greenbelt; Griffon Park marina possible; land available in eastern portion of city
Ontario	Ontario County	Developing 400 acre park
	City of Geneva	Plan park on Seneca Lake
	Town of Richmond	Possibly acquire lake-beach area
	Village of Victor	Owns 8-acre undeveloped park
Orleans	Orleans County	Westword extension of Lake Ontario State Parkway will pass relatively unspoiled shoreline. Barge Canal passes through county
Steuben	Steuben County	County owns 100 acres in 4 forests (coop. lease on CE Almond Reservoir)
Wayne	Wayne County	Possesses scenic shoreline on Lake Ontario; has many marshes. Barge Canal passes through. Has Foreman County Park
	Town of Easton	Has a 100-acre undeveloped site
	Town of Ontario	Has 2 sites; total 60 acres
Wyoming	Wyoming County	Source of many important streams
	Village of Wyoming	Will develop picnic area, expressed need for swim and ski sites
Yates	Yates County	A popular resort area
	Village of Penn Yan	Acquire 80-acre site; own 2 watershed areas-total 9 acres
McKean, Pa.	Village of Kane	Has Evergreen and Glenwood Parks

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The capacity of potential market area recreation resources to meet the 1980 needs will be discussed in two phases; first, the Genesee River Basin, and second, the remainder of the market area.

Genesee River Basin.

Presently, the most significant existing water-oriented recreation resources of the Genesee Basin include Hemlock and Canadice Lakes, the New York State Barge Canal, and the Genesee River. Hemlock and Canadice Lakes are rigidly controlled for recreation opportunity by the city of Rochester. These lakes are utilized as water supply reservoirs for the city.

Only a small segment of the Barge Canal traverses the Genesee Basin; however, two areas on this segment offer possibilities.* These areas are described as follows: (See Figure 8).

Plan No.	County	Land Acres	Location	Program	Remarks	Recre. Days Capacity-Typical Summer Sunday
3	Monroe	100	Town of Gates	Marina Picnicking Swim Pool	Day-use site for Rochester Area.	2,000**
4	Monroe	330	Town of Greece	Marina Picnicking Swim Pool	Serve the Rochester Area; could plan overnight facilities for boaters.	6,600**

The Genesee River presently offers excellent potential for canoeing in the upper watershed for a short period in the spring. The River also offers potential for fishing in the upper watershed and some boating opportunity near the Barge Canal and Rochester. However, in the lower watershed there is little developed access and considering the present pollution problem the potential of the lower Genesee River as it exists is limited.

The Corps of Engineers identified 14 potential reservoir sites in the Genesee River Basin. During the course of the Comprehensive Study, Task Group #8, Recreation, and Task Group #11, Site Screening, evaluated each potential reservoir. The results of these evaluations are presented briefly in ORP Table 3.

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* From New York State Barge Canal, Outdoor Recreation Study, U.S. Army Engineer District, N.Y. (Vollmer Associates, 1965)

**Based on development at 20 persons per acre

OUTDOOR RECREATION PLAN TABLE 3 - Results of Preliminary Site Screening, Corps of Engineers Reservoirs, Genesee River Basin.

CE No.	Recre. Pool (surface acres)	Source or Area	Remarks
1	1,550	Stannard, Genesee River, Allegany County, N.Y.	Selected by Task Group #s 8 and 11
2	330	Stannard, Chenunda Creek, Allegany County, N.Y.	Screened out by Task Group #s 8 and 11
3	370	Vandermark, Vandermark Creek, Allegany County, N.Y.	Screened out by Task Group #s 8 and 11
4	900	Angelica, Black and Angelica Creeks, Allegany County, N.Y.	Selected by Task Group #s 8 and 11
5	1,400	Summit, Black Creek, Allegany County, N.Y.	Selected by Task Group #s 8 and 11
6	2,650	Belfast, Genesee River, Allegany County, N.Y.	Selected by Task Group #s 8 and 11
7	510	Cold, Cold Creek, Allegany County, N.Y.	Screened out by Task Group #s 8 and 11
8	280	Rush, Rush Creek, Allegany County, N.Y.	Screened out by Task Group #s 8 and 11
9	950	Wiscoy, Wiscoy Creek, Allegany County, N.Y.	Screened out by Task Group #s 8 and 11
10	4,100	Portage, Genesee River, Wyoming County, N.Y.	Selected by Task Group #s 8 and 11
11	660	Tuscarora, Keshequa Creek, Livingston County, N.Y.	Screened out by Task Group #s 8 and 11
12	380	Poag's Hole, Canaseraga Creek, Steuben County, N.Y.	Screened out by Task Group #s 8 and 11
13	1,340	Honeoye, Honeoye Creek, Livingston County, N.Y.	Screened out by Task Group #s 8 and 11
14	640	Oatka, Oatka Creek, Genesee and Livingston Counties, N.Y.	Screened out by Task Group #s 8 and 11

Subsequent to the needs analysis of Part III, the potential Corps of Engineers' reservoir sites were reviewed again to determine those which could best assist in meeting the outdoor recreation needs of the basin and the market area. The results of this review formed the Bureau's recommendations for meetings of Task Group #12, Basin and Project Plan Formulation. An evaluation of the sites suggested for Plan Formulation follows. (See Figure 8 for locations). Land requirements in terms of a "recreation management unit" were estimated at three times the water surface acres for Corps' impoundments. Exceptions are noted.

Angelica, CE site 4. This is a desirable site for outdoor recreation development in a small, scenic valley near Letchworth State Park. Although Angelica Reservoir would be small in terms of surface acres of water, it could be developed to provide high quality opportunity for the four key activities. Based on a development factor of 320 visitors per surface acre annually, the site could expect an annual visitation of 288,000 by 1980. Estimated daily capacity (typical summer Sunday) is 6,800; lands required were estimated at 2,700 acres.

Portage, CE site 10. Of the Corps' basin impoundment proposals, Portage Reservoir offers the most significant outdoor recreation potential. The reservoir is not only the largest in surface acres, but also located immediately above Letchworth State Park on the Genesee River. The close association of the two resource areas dictates complementary development. It is a virtual truism that what one area lacks in opportunity, the other has. For example, Letchworth Park lacks a large body of water, hence general motor boating opportunity. The Portage Reservoir should provide that opportunity. The Portage site is located in an attractive valley of the Genesee, but does not have the deep scenic gorge and cataracts of the river that are within Letchworth.

As an ideal complement to Letchworth State Park, recreation development of the Portage project should feature boating with camping, picnicking, and swimming as additional key activities. Many other activities should be afforded such as horseback riding, hiking trails, games and sports areas, fishing, hunting, and nature study. Local public and private development opportunity should be encouraged where possible, and in conjunction with reservoir master planning. The expected attraction of a combined Letchworth-Portage development is such that local public and private interests could perform a valuable function overall by providing, in addition to service facilities, such opportunity as horseback riding, farm vacation sites, golfing, aircraft landing strips, historic interpretation, lodges, and even the possibility of steam railroad tours. Winter sports, while desirable, may prove difficult as a result of erratic snowfall in the area.

The opportunity to combine the well-known Letchworth State Park with a large water resource makes this project paramount. Its potential to satisfy greater regional as well as local needs establishes a combined Letchworth-Portage recreation area as the focal point of the outdoor recreation plan for the Genesee River Basin. This project is of national significance in considering the quality of the resource and its potential for development.

Based on a development factor of 320 annual visits per surface acre, estimated annual visitation for the Portage site, 1980, is 1,400,000 with a daily capacity of 32,000. Using a rate of increase factor similar to Letchworth State Park's expected increase in visitation, it is estimated that there will be 2,000,000 visitors annually at Portage by 2020 with a daily capacity of 47,000 recreation days. To develop the optimum potential of the Portage area, the lands required for a management unit were estimated at 16,000 acres.

Tuscarora, CE site 11. This site was screened out in a preliminary analysis by Task Group #s 8 and 11. The Tuscarora site could be a valuable complement to the nearby Portage development. Also, Task Group #9, Fish and Wildlife, has identified this site as an important multiple purpose project. This project on Keshequa Creek should be developed for camping, picnicking, and swimming. Boating opportunity should be provided, but with restricted speed areas or motor sizes. The project's potential invites closely-coordinated planning between fish and wildlife and recreation interests.

At 320 annual visits per acre, the expected annual visitation at the Tuscarora site is 211,200 with a daily capacity of 5,000. Land requirements are estimated at 2,000 acres.

Poag's Hole, CE site 12. Poag's Hole is a small site on upper Canaseraga Creek. It was screened out by Task Group #s 8 and 11. Task Group #11 questioned the engineering feasibility. In this report, the original site of the Poag's Hole structure is also not recommended. However, it is felt that another engineering feasibility study of upper Canaseraga Creek should be made to determine a more suitable location for a small impoundment. A primary benefit of an impoundment in this area would be to augment and enhance swimming opportunity in Stony Brook State Park downstream. Since upper Canaseraga Creek is an important fish and wildlife resource area, close coordination between this interest and recreation should be maintained.

No estimates of annual visitation or area requirements for were made for the original Poag's Hole site or its possible relocation.

Oatka, CE site 14. The Oatka site in northeastern Genesee County is adjacent to Monroe County, hence Rochester. Its close proximity to a metropolitan area places it in an area with the greatest outdoor recreation needs. An Oatka reservoir project should be an intensively-developed day use area. It should feature swimming, picnicking, games and sports, and non-motor boating. Expected use would be similar to that of Monroe County parks. About 1,500 visitors per surface acre are anticipated annually by 1980, or 1,006,000 with a daily capacity of 23,600 on 1,900 acres.

The Corps of Engineers' sites selected in the preliminary Task Group analysis (ORP Table 3) that are not favored in this report are:

Stannard, CE site 1. Engineering design for this site indicates that severe drawdown of the pool will be required during the recreation season for project operation. Also, this upstream Genesee River site would curtail or entirely eliminate the valuable canoeing stretch of the river downstream from the project.

Summit, CE site 5. A similar Soil Conservation Service proposal for the site was determined to be more economical.

Belfast, CE site 6. The relocation of New York route 17 will interfere with the Belfast project. Since the probable relocation of the major highway will be near the Portage site, it would be advantageous to that more important resource potential. Also, the Belfast project site is close to the upstream reach of the proposed Portage pool. Its operation could adversely affect the stability of the summer pool at the Portage project.

There were 14 possible Soil Conservation Service projects in the Genesee River Basin recommended by Task Group #8 in the preliminary screening process. This report concurs with the recommendations and presents the following evaluation of the various site potentials in ORP Table 4. Figure 8 contains the location of 13 of these potential sites. (See narrative of site 14-2, ORP Table 4).

ORP Table 4 formed the Bureau's recommendations for meetings of Task Group #12, Basin and Project Plan Formulation.

Since the sponsorship of SCS potential recreation sites may vary widely in requirements for land, programs, and facilities, estimated management units were based upon two times the surface acres of the pool. The surface acreage of some SCS sites were changed slightly after recreation visitation estimates were made. However, the recreation visitation estimates were not changed.

OUTDOOR RECREATION PLAN TABLE 4 - Evaluation of Potential Soil Conservation Service Sites, Genesee River Basin.

Site No.	Recre. Pool (acres)	Source or Area	Remarks	Expected Annual Visitation - 1980 (recre. days)	Daily Capacity (recre. days)	Land Mgt. Unit (acres)
1-5	110	West Branch, Genesee River, Potter County, Pa.	A headwaters impoundment; potential cold-water fishery. Should be moderately developed for "back country" camping, hiking, non-motor boating, fishing. Could be a stop on a branch of the Finger Lakes Trail.	82,700	1,900	200
3-4	156	Marsh Creek, Allegany County, N.Y.	Site near Wellsville; potential fishery. Could be moderately developed as a day-use site for Wellsville area with picnicking, swimming, and fishing featured. Should consider non-motor boating and trail to natural areas nearby.	97,300	2,300	300
5-1	138	Vandermark Creek, Allegany County, N.Y.	Site near Wellsville. Offers potential day-use opportunity for picnicking and swimming. It is suggested that the control structure be regulated for possible augmentation of the Genesee River to enhance canoeing and riverside recreation.	30,000	700	300

OUTDOOR RECREATION PLAN TABLE 4 - Continued

Site No.	Recre. Pool (acres)	Source or Area	Remarks	Expected Annual Visitation - 1980 (recre. days)	Daily Capacity (recre.days)	Land Mgt. Unit (acres)
7-2	1,715	Black Creek (Birdsall), Allegany County, N.Y.	Recommended over CE site 5. A highly significant fish and wildlife area suitable for multiple purpose development. Recommend fish and wildlife conservation as primary purpose. General recreation would include development for nature study, horseback riding, and the key activities with boating restricted. Visitation computed on one-half the surface acres to "control" excessive recreation development.	120,000	3,800	3,400
8-13	227	Wigwam Creek, Allegany County, N.Y.	Site near Allen Lake in the Allegany State Reforestation Area. Allen Lake and SCS site 8-13 offer potential good cold-water fishery. Site should be developed for limited general recreation with "back country" camping, picnicking, non-motor boating, fishing, swimming, and a bridle trail connecting the two lakes.	56,000	1,300	500
10-2	52	Houghton #2	These sites are near the upper end of the proposed CE Portage Reservoir. The sites could be integrated into an overall Letchworth-Portage development plan. It is recommended that both sites be considered for private development. Estimated visitation for the smaller site (10-14) was 750 visits per acre annually based on the nearness and influence of Portage; site 10-2 based on 500 annual visits per acre.	26,700	600	100
10-14	40	Houghton #1 (Both sites are on a small tributary of the Genesee River, Allegany County, N.Y.)		30,000	700	100

OUTDOOR RECREATION PLAN TABLE 4 - Continued

Site No.	Recre. Pool (acres)	Source or Area	Remarks	Expected Annual Visitation - 1980 (recre. days)	Daily Capacity (recre.days)	Land Mgt. Unit (acres)
13-6	243	Sugar Creek, Livingston County, N.Y.	A site on the upper Canaseraga watershed. Potentially a good fishery. Should be developed to provide for the four key activities with restricted boating.	97,200	2,300	500
14-2	280	Pearl Creek, Wyoming County, N.Y.	Near Mt.Morris and Geneseo. A potential area for local day-use development. This site is a highly significant waterfowl area (U.S. Fish and Wildlife Service). It is recommended that wildlife management be paramount to any general recreation development at this site.	--	--	--
15-2	720	Jacox Creek, Livingston County, N.Y.	Near Geneseo and Avon. A shallow site, significant as a waterfowl area (U.S. Fish & Wildlife Service). Recommend multiple purpose development with day-use recreation opportunity, boating restricted. Estimated annual visitation based on one-half the surface acres.	72,000	1,700	1,400

OUTDOOR RECREATION PLAN TABLE 4 - Continued

Site No.	Recre. Pool (acres)	Source of Area	Remarks	Expected Annual Visitation - 1980 (recre. days)	Daily Capacity (recre. days)	Land Mgt. Unit (acres)
16-2	180	Calabogue Creek, Livingston County, N.Y.	Located between headwaters of Conesus and Hemlock Lakes. Recommend development as day-use area featuring picnicking and swimming; restricted boating. Development of the site should consider opportunity for utilizing the Lakeville-Livonia Steam Railroad tour line.	48,700	1,100	400
17-24	258	Honeoye Creek, Ontario County, N.Y.	Near Canandaigua in scenic area. Recommend general recreation development for the key activities, boating restricted.	96,000	2,300	500
19-11	315	Black Creek	Both sites offer significant potential for metropolitan Monroe County in sub-area with greatest needs for water-oriented recreation opportunity. Should be intensely developed as day-use sites. Annual visitation predicted on current use of Monroe County parks. Land estimates at three times pool size.	900,000	21,200	900
20-2	140	Red Creek drainage (Both Monroe County, N.Y.)		600,000	14,100	400

The following state-owned areas of New York, in the Genesee River Basin offer potential for outdoor recreation development.

County	Name	Acres	
		Land	Water
Allegany	Allegany State Reforestation Area	44,900	65
Livingston	Livingston State Reforestation Area	2,590	--

This potential has not been assessed in terms of estimated annual recreation days expected by 1980. SCS site 8-13 lies, in part, within the Allegany Reforestation Area, and the nearby Allen Lake lies wholely within the Area. It is anticipated that outdoor recreation development within the Allegany Reforestation Area will center about the two bodies of water.

While only minimal assessment of the New York state reforestation and game management lands was made in or out of the Genesee Basin, it should be pointed out that additions to these lands are purchased under a multiple use category with cooperative planning efforts of the New York Divisions of Lands and Forests and Fish and Game.

Potential Resources of the Market Area

Some potential recreation resources in the market area outside the Genesee River Basin have been assessed according to estimated capacity in annual and typical summer Sunday (daily capacity) recreation days. While an identification of these resources is by no means complete, the following tables do indicate a substantial amount of outdoor recreation potential in water-oriented recreation days and in acres of land and water.

OUTDOOR RECREATION PLAN TABLE 5 - Corps of Engineers Impoundment Sites--Potential for Recreation, Genesee Recreation Market Area.

Recre. Pool (Acres)	Source or Area	Expected Annual Visitation - 1980 (recre. days)	Daily Capacity	Remarks	Land Mgt. Unit (acres)
590	Sierks Reservoir, Tonawanda Creek, Wyoming County, N.Y.	543,000	12,800	Recommended. Detailed report prepared by BOR on feasibility of recreation as a project purpose. Desirable site for intensive development near Buffalo. The Arcade & Attica Steam Railroad should be considered in plans for this site.	1,800
300 est	Java, Buffalo Creek, Wyoming County, N.Y.	840,000	19,700		900
350	Cowlesville, Cayuga Creek, Erie County, N.Y.	980,000	23,000		1,000
800	Wales Center, Buffalo Creek, Erie County, N.Y.	1,120,000	26,300		2,400
550	Spring Brook, Cazenovia Creek, Erie County, N.Y.	770,000	18,100		1,600
1,200	Tioga-Hammond Reservoir, Tioga County, N.Y.	384,000	9,000	Susquehanna River Basin	3,600
600	Cowanesque Reservoir, Tioga County, Pa.	192,000	4,500	Susquehanna River Basin	1,800

OUTDOOR RECREATION PLAN TABLE 6 - Evaluation of the Recreation Potential of Proposed Small Boat Harbors on Lakes Erie and Ontario.*

Map No.	Location	Typical Summer Sunday Recreation Days 1980	
		Single Purpose Boat**	Minimum Land Required (acres)
7	Lake Erie State Park	2,300	5.2
6	Dunkirk	5,200	11.0
5	Cattaraugus Creek	5,400	11.2
8	Sturgeon Point	3,000	5.5
-	Hamburg Park	2,600	5.5
10	Fourmile Creek	2,100	4.5
1	Wilson	4,000	8.0
12	Olcott	2,900	5.8
11	Golden Hill	2,200	4.7
13	Oak Orchard	2,700	6.0
3	Hamlin Beach	2,400	5.6
2	Broddock Bay	9,100	18.0
9	Irondequoit Bay	17,500	34.0
15	Putneyville	800	1.8
4	Great Sodus Bay	7,000	14.0
14	Port Bay	2,700	5.5
	Total	71,900	146.9

* All recommended.

** Single purpose - assume development for boating activity only (boat ramp, moorings, docks, service facility and auto parking). Land estimates based on 100 cars per acre for moored boats; 50 cars with trailers per acre for trailer borne boats.

OUTDOOR RECREATION PLAN TABLE 7 - Soil Conservation Service Impoundment Site Potential, Genesee Recreation Market Area.

Ischua Creek Watershed Plan, Cattaraugus County, N.Y.

Recre. Pool (acres)	Source or Area	Expected Annual Visitation - 1980 (recre. days)	Daily Capacity	Remarks	Land Mgt. Unit (acres)
17	Gates Lake	2,100	50	Multiple use area planned for flood control and fish and wildlife development.	--
25	Harwood Lake	3,100	100	Site utilized as a trout fishery.	--
220	Beaver Meadows Marsh	--	-	Very shallow area devoted to waterfowl habitat.	--
--	Ischua Creek, 5.3 miles	--	-	Stream improvement for trout habitat between Cadiz and Machias; recognized canoeing stream below this area.	--

Conewango Creek Watershed, Cattaraugus and Chautauqua Counties, N.Y.

800	Hamlet Site	256,000	6,000	Recreation a project purpose; large area suitable for general recreation development including unrestricted boating.	1,600

OUTDOOR RECREATION PLAN TABLE 8 - Potential Outdoor Recreation Developments, Barge Canal, Genesee Recreation Market Area.*

Plan No.	County	Approx. Size (Acres)	Location	Possible Program	Remarks	Daily Capacity (Recre. Days)
1	Wayne	800	Town of Macedon	Boat Launch Camping Picnicking	Could tie in with Monroe Co.'s White Brook Park	16,200
2	Monroe	260	Towns of: Brighton Pittsford Henrietta	Boat Launch Picnicking Swim Pool	Day-use site for Rochester Area	5,300
5	Orleans**	430	Town of Murray	Boat Launch Picnicking	Rest stop development	8,700
6	Orleans**	850	Town of Albion	Boat Launch Camping Picnicking		17,200
7	Niagara**	270	Town of Royalton	Marina Picnicking Swim Pool	Serve Lockport area; could plan overnight facilities	5,500
8	Niagara-Erie	560	Tonawanda Creek	Boat Launch Camping Picnicking Swim Pool	Serve Buffalo-Niagara Falls area	11,400
9	Niagara-Erie	150	Tonawanda Creek	Boat Launch Picnicking Swim Pool	High capacity day-use site serving North Tonawanda	3,000

* From N.Y. State Barge Canal, Outdoor Recreation Study, U.S. Army Engineer District, N.Y. (Vollmer Associates, 1965)
**Interconnection by equestrian-bicycle trail.

OUTDOOR RECREATION PLAN TABLE 9 - Canoeing Streams of Significance Outside the Genesee River Basin.*

County	Stream-Description	Length (miles)	Annual Visitation (Rec.Days)	Daily Capacity (Rec.Days)
Orleans, N.Y.	Johnson Creek, tributary of Lake Ontario 14-mile cruise from Lyndonville to Lake Ontario	14	15,848	300
Cattaraugus, N.Y.	Ischus Creek, tributary of Olean Creek 10-mile cruise from bridge on 5-mile road to Hinsdale	10	11,320	200
Cattaraugus, N.Y.	Cattaraugus Creek, tributary of Lake Erie 38-mile cruise from Sardinia to junction of (scenic Zoar Valley) Peter Brook at exit from gorge, 1 mile east of Gowanda	38	43,016	900
McKean, Pa. Cattaraugus, N.Y.	Allegheny River, main stem 40-mile cruise from Eldred, McKean Co., Pa. thru Olean to W. Salamanca (backwater of Allegheny Reservoir)	40	45,280	900
Tioga, Pa.	Pine Creek,** tributary of West Branch, Susquehanna River 77.5 mis. Galeton to Jersey Shore (Grand Canyon of Pennsylvania)	77.5	87,730	1,800
	Total	179.5	203,194	4,100

* From: Appalachian Water, Vol. I, Burmeister (1962); Canoeable Waterways of New York State, Grinnell

**Recommendations referred to Susquehanna River Basin Comprehensive Study

OUTDOOR RECREATION PLAN TABLE 10 - Potential Recreation Areas under State Administration, Recreation Market Area.*

County	Name	Acres Land	Acres Water
Allegany, N.Y.**	Allegany State Reforestation Area	44,900	65
Cattaraugus	Cattaraugus State Reforestation Area	32,935	70
	Randolph Fish Hatchery	51	--
	Zoar Valley Multiple Use Area	3,474	Cattaraugus Creek
Chautauqua	Chautauqua State Reforestation Area	16,700	--
Genesee	John White Game Farm	--	--
Livingston**	Livingston State Reforestation Area	2,590	--
Ontario	Ontario State Reforestation Area	715	--
	Stid Hill Multiple Use Area	731	--
Steuben	Steuben State Reforestation Area	24,215	20
Wyoming	Carleton Hill Multiple Use Area	1,752	--
Yates	Yates State Reforestation Area	1,900	--
McKean, Pa.	State Forest and Game Lands	--	--
Potter	Cherry Springs Forest Picnic Area	48	--
	Patterson Forest Picnic Area	10	--
	Prouty Place Forest Picnic Area	5	--
	Other State Forest and Game Lands	--	--
Tioga	Asaph Run Forest Picnic Area	1	--
	Bradley Wales Forest Picnic Area	4	--
	County Bridge Forest Picnic Area	4	--
	Fahneystock Forest Picnic Area	1	--
	Fall Brook Forest Picnic Area	4	--
	Morris Forest Picnic Area	150	--
	Stony Fork Forest Picnic Area	4	--
	Tiadaghton Forest Picnic Area	1	--
	Other State Forest and Game Lands	--	--
Warren	State Forest and Game Lands	--	--

* No evaluation of daily capacity made
**Genesee River Basin

B. Establishment of Goals.

Part III, Table 9, demonstrated that the most significant needs in the market area were for the water-oriented activities of boating and swimming. Table 10 disclosed a need for about 600,800 recreation days on a typical summer Sunday in 1980; 2,000,000 by the year 2020. In terms of recreation resources to meet the 1980 needs, it was estimated that about 32,000 acres of land and 89,000 acres of water would be required; by the year 2020, about 206,000 acres of land and 225,000 acres of water would be required.

A substantial inventory of existing, prospective and potential water-oriented recreation resources in the Genesee Basin and in the market area was appraised. ORP Table 11 summarizes the capacity of these potential resources to meet the needs of 1980. The capacity of existing and prospective resources to meet the needs of 1980 was presented in Part III.

OUTDOOR RECREATION PLAN TABLE 11 - Summary of Appraised Recreation Resources to Meet 1980 Needs, Genesee River Basin and Market Area.

	Typical Summer Sunday		
		(acres)	
	Recreation Days	Land	Water
Estimated Needs	600,800	31,700	89,400
Basin Resources			
Barge Canal	8,600	400	--
Corps of Engineers	68,300	20,700	6,300*
Soil Conservation Service	54,000	9,000	4,574*
	130,900	30,130	10,874
Market Area Resources			
Corps of Engineers	113,400	13,100	4,390*
Corps Harbors of Refuge (Lakes Erie & Ontario)	71,900	147	66,675**
Soil Conservation Service	6,150	1,600	1,062*
Barge Canal	67,300	3,320	--
Canoe Streams	4,100	--	--
	262,850	18,167	72,127**
Total Resources	393,750	48,297	83,001*
Difference	207,050	+ 16,597	6,399*

* Water resource acres estimated on surface acres of potential impoundments including those small sites with restricted boating. Actual unrestricted boating acres probably less than 10,000 for the construction agencies.

**Great Lakes potential for boating estimated at 5 acres per boat (Boats estimated by Buffalo District, CE)

ORP Table 11 discloses that neither the Genesee Basin or market area can meet the estimated water-oriented outdoor recreation needs by 1980. Land requirements are more than met according to Table 11, but based on hypothetical "management units-parks" and the assumption that all potential areas would be developed, this estimate is likely quite high. Without identification of further substantial resources and the projection of far distant demand, there is little need to draw a resource requirements balance table for 2020.

It is apparent that developments within the Genesee River Basin will be unable to meet the day use market area needs envisioned by 1980, especially unrestricted boating. It is doubtful also whether the identified potential may be realized and developed by 1980. Based on the opportunities and problems revealed by the appraisal of resource potentials, the goals of the Genesee River Basin and market area recreation plan may be stated:

(1) To provide quality water-oriented outdoor recreation opportunity consistent with both the resource potential offered and the demonstrated needs to be met.

(2) To provide in addition to the Key activities as much opportunity for outdoor recreation activities as practical.

(3) To encourage private recreation development and services.

(4) To retain broad planning concepts sufficient to encourage and stimulate cooperative and mutual interests in natural resource conservation and management, natural and landscaped beauty, and opportunity for the handicapped.

(5) To provide source material and background for future regional, state and local planning for the water and related land resources of the Genesee River Basin and its market area.

C. Alternatives

The preceding evaluation of resource potentials was presented to Task Group #12, the Basin and Project Plan Formulation Subcommittee of the Genesee Study. In weighing the requirements and alternatives of all Basin and project needs i.e. flood control, hydroelectric power, water quality, water supply, agriculture, fish and wildlife, and recreation, one basic plan was offered. Briefly, the overall Plan proposes the Corps of Engineers' Portage Reservoir in combination with Soil Conservation Service upland sites. The potential recreation sites evaluated in ORP Table 4 were presented by the Soil Conservation Service to Task Group #12.

Several possible plans for design and operation of the Portage dam and reservoir under various project purposes were offered by the Corps of Engineers. It was concluded by the Plan Formulation Task Group that the

proposal for a Portage project with the purposes of hydroelectric power, water quality control, fish and wildlife, and recreation, would be feasible. A detailed discussion of the proposed Portage project's design and operation is contained in the Project Design Appendix of the Genesee Study. Also, the Task Group #8, Recreation, report contains a detailed description of the project's design for recreation development including a proposal for land acquisition associated with the project's joint purposes and separable lands for recreation.

This report presents a brief description of the Portage project in relation to its overall impact on the needs of the Genesee recreation market area. The Portage dam will be located on the Genesee River in southeastern Wyoming County immediately north of the village of Portageville and adjacent to Letchworth State Park.

The control structure will be a gated, concrete, gravity dam about 40 feet high. The reservoir flood control pool will be about 17 miles long, the conservation (recreation) pool about 13 miles long. The width of conservation pool will vary from about 1/4 to 3/4 miles and contain about 4,100 surface acres of water. The flood control pool will be about 6,400 surface acres. Total storage of the reservoir will be 283,000 acre feet.

The proposal for a partially underground hydroelectric power generation plant at the Portage site would utilize the present Mt. Morris reservoir as a pump storage pool. During periods of off-peak power requirements, water would be pumped from the Mt. Morris to the Portage reservoir. The power plan calls for an increase in the surface acres of Mt. Morris reservoir from its present 450 acres to 2,400 acres. The increased pool at Mt. Morris would be provided in daylight hours during the recreation season. Under such a proposal, the Genesee Park Commission would plan several access points to Mt. Morris for fishing and restricted boating. Also, an excursion boat could be operated on Mt. Morris to provide a most spectacular view of the Genesee gorge from below. The development of Mt. Morris will be recommended in the outdoor recreation plan framework.

The design and operation of the Portage dam and reservoir, utilizing the Mt. Morris pool, fosters recreation development and appreciation of the project area. During the period May to November, reservoir drawdown is not expected to exceed five feet. In addition, sufficient water releases from the Portage structure will be provided to maintain the scenic enhancement of the Genesee River falls in Letchworth Park.

In consideration of water-oriented outdoor recreation needs in the Genesee River Basin and its recreation market area, alternative sites to the Portage proposal were not weighed. Rather, the significant needs suggest consideration of additional sites as well as development of the Lakes Erie and Ontario potential.

D. Features of the Plan.

The formulation of the outdoor recreation plan for the Genesee River Basin and its market area considers the development and enhancement of resources in excess of the projects proposed by the construction agencies. However, partly as a result of the construction proposals, certain complementary recreation opportunities are brought to light and are suggested for total regional enhancement.

(1) Plan Framework.

The expansion and improvement of existing areas and facilities has been considered in Part III under programmed supply between 1960 and 1980. The Genesee outdoor recreation plan assumes that these developments will materialize in the states of New York and Pennsylvania by 1980.

In the development of new areas and facilities, the outdoor recreation plan proposes the following recommendations within and outside the Genesee River Basin: (Digest, Figure 8)

(1) New York State Barge Canal - 9 sites

(2) Corps of Engineers - 4 sites (Poag's Hole site a restudy)

(3) Corps of Engineers, Harbors of Refuge - 16 sites

(4) Soil Conservation Service - 13 sites (plus site 14-2 for fish and wildlife development)

(5) Canoeing streams - develope access to 5 streams

Considering the developments above, the following additional recommendations enhance not only the natural recreation resources but also provide needed water-oriented recreation opportunity.

The Genesee River offers a fine white water canoeing course for about six weeks during the spring from about Wellsville to just south of Belmont. In summer, this portion of the river offers fishing, nature study, and a few "swim'in holes." ORP Table 12 proposes three access sites to the Genesee River in Allegany County along the prime canoeing reach. The sites should be primarily for day use with limited development; some opportunity for canoe-camping could be provided. The sites should be connected by a foot trail. Facilities for picnicking, boat launching, and games and sports would be expected.

From about Avon to the Barge Canal, the Genesee offers potential for canoe "paddling" and limited-motor boating. With pollution control, there would be opportunity for fishing and swimming. ORP Table 12 proposes three access sites along the lower Genesee. Again, these sites should be small day-use areas developed primarily for access to the River. Facilities for picnicking, boat launching, games and sports, and walking trails should be provided. It should be possible for the lower Genesee to be utilized for 8-oar canoeing competition by the local universities.

OUTDOOR RECREATION PLAN TABLE 12 - Small Access Sites Proposed for Development along the Genesee River.*

County	Size (acres)	Site Location	River (miles)	Annual Visitation (rec.days)	Daily Capacity (rec.days)
Allegheny	10	Approx. 2 miles south of Wellsville on state Rt. 19	12.25	28,300	600
Allegheny	10	Approx. 1 mile south of Belmont on state Rt. 19	12	28,300	600
Allegheny	10	Approx. 1 mile south of the Caneadea junction of state Rts. 19 and 243	42.70	28,300	600
Livingston	10	Approx. 1/2 mile southeast of junction of state Rt. 5 and U.S. route 20, near Avon	36.50	55,000	1,100
Monroe	10	Approx. 1 mile northwest of junction of state Rts. 25 and 39	20	55,000	1,100
Monroe	10	Approx. 1/4 mile north of junction of state Rt. 383 and Coates Road	29	55,000	1,100

* For detailed description of the canoe routes refer to Burmeister, Walter F., 1962. Appalachian Water, The Canoe Cruisers Assoc., Wash., D.C.

The Finger Lakes Trail Conference, Rochester, N.Y., has an active program for the development of trails in southwestern New York. ORP Table 13 (and Figure 8) outlines the existing Conference trail plans from connection with Canada's Bruce Trail to the proposed trail leading to eastern New York.

ORP Table 13 contains the recommended extensions to the Finger Lakes Trail system.

It is indeed fortunate that most of the outstanding natural resources in the market area are in public ownership. Some examples are the Zoar Valley of Cattaraugus Creek, the Genesee River gorge, the Devil's Nose drumlin of Lake Ontario at Hamlin Beach, and the wetlands of Tonawanda Creek in Genesee-Orleans Counties. ORP Table 14 recommends three additional areas for preservation. Developments at these areas should be limited to hiking trails and nature interpretation.

OUTDOOR RECREATION PLAN TABLE 13 - Finger Lakes Trail System.

COMPLETE EXISTING PLAN	
Conservation Trail	Lewiston (Niagara County) to Allegany State Park (Cattaraugus County) via East Aurora (Erie County). Joins Canada's Bruce Trail at Queenston, Ontario
Finger Lakes Trail	Allegany State Park to Bath (Steuben County) via Portageville (Wyoming County)
Bristol Hills Branch	Bath to Naples (Ontario County)
RECOMMENDED EXTENSION TO EXISTING PLAN*	
3-Rivers Rise Branch	Hornell (Steuben County) to Cobbs Hill (Potter County, Pennsylvania) via Wellsville (Allegany County)
Allegheny River Branch	Allegany State Park to Cobbs Hill via Coudersport (Potter County, Pennsylvania)

* TRAILS FOR AMERICA, Bureau of Outdoor Recreation, Department of the Interior, U.S. Government Printing Office, 1966, recommends the North County Trail. The preliminary consideration of this trail suggests a route close to the above Allegheny River Branch. The Genesee Comprehensive Study of Outdoor Recreation suggests a synonymous route for the North Country Trail and the Allegheny River Branch of the Finger Lakes Trail system.

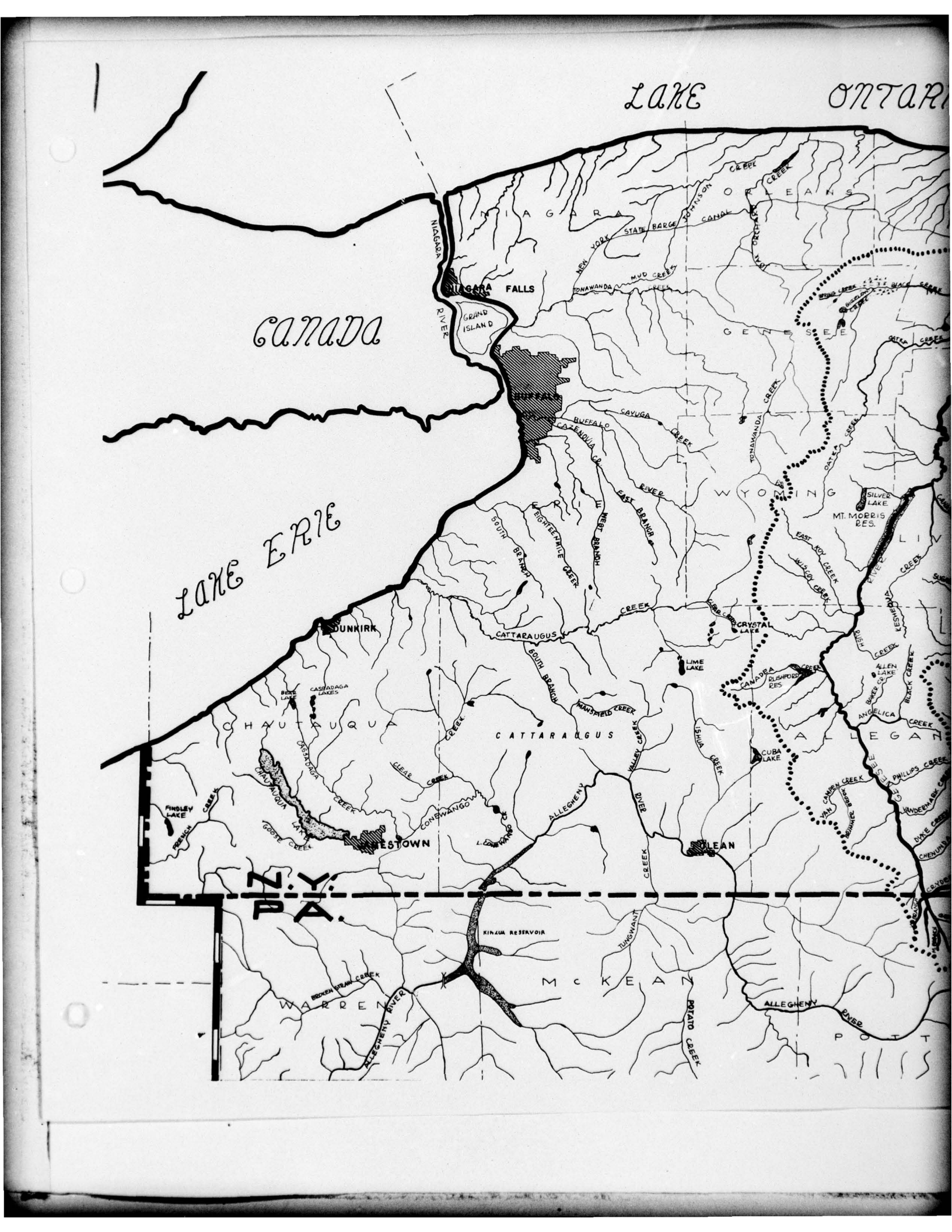
OUTDOOR RECREATION PLAN TABLE 14 - Natural Areas Recommended for Preservation, Genesee River Basin Recreation Market Area.

County	Name or Identification	Significance
Potter County, Pa.	"3-Rivers Rise"	The headwaters and source of the Allegheny and Genesee Rivers; upper watershed of West Branch Susquehanna River.
Allegany County, N.Y.	Alma Pond	Pond and wetlands area noted for plant and bird life.
Wayne County, N.Y.	Wayne County Sanctuary	Wetland area notable as important Great Blue Heron rookery in western New York.

The following areas which provide significant fish and wildlife habitat were identified from U.S. Fish and Wildlife Service data. It is recommended that any proposals for alteration of these areas fully weigh the value of the fish and wildlife resources which may be adversely affected. General recreation and fish and wildlife purposes have been coordinated in the recommendations and suggestions for the various potential impoundments identified in this report. The water resources map of Genesee River Basin recreation market area, Figure 7, locates the fish and wildlife resource areas.

County(s)	Resource Area
Allegany	Allen Lake
	Angelica Creek
	Birdsall Swamp
	Black Creek
	Chenunda Creek
	Cryder Creek
	Dyke Creek
	Genesee River
Allegany-Steuben	Little Genesee Creek
	Rushford Lake
	Mill Creek
	Stony Brook
	Sugar Creek
Cattaraugus	Allegheny River
	Cattaraugus Creek
	Cattaraugus Creek (south branch)
	Conewango Creek
	Ischua (Olean) Creek
	Lime Lake Outlet
	Little Conewango Creek
	Mansfield Creek
	Valley Creek
Cattaraugus-Wyoming	Clear Creek
Chautauqua	Bear Lake
	Bear Lake Outlet
	Cassadaga Lakes
	Cassadaga Lakes Outlet
	Chautauqua Creek
	Chautauqua Lake
	Clear Creek
	Findley Lake
	Goose Creek

Genesee-Monroe	Bigelow Creek
	Black Creek
	Oatka Creek
	Spring Creek
Livingston	Canaseraga Creek
	Conesus Lake Inlets
	Conesus Lake
	Groveland Flats
Livingston-Monroe	Genesee River (Mt. Morris & Barge Canal)
Ontario	Canadice Lake
	Hemlock Lakes
	Honeoye Lake
	Naples Creek
Potter	Genesee River, Middle & West Branch
Steuben	Cohocton River
	Keuka Lake Inlet
Wyoming	Cattaraugus Creek
	East Koy Creek
	Rushford Lake
	Silver Lake
	Wiscoy Creek
Wyoming-Genesee	Oatka Creek


LAKE ONTARI
CANADA
LAKE ERIE
NIAGARA RIVER
NIAGARA FALLS
GRAND ISLAND
BUFFALO
NIAGARA
ORLEANS
GENESEE
WYOMING
LIVINGSTON
ALLEGANY
CHAUTAUQUA
CATTARAUGUS
WARREN
McKEAN
POTTER
N.Y.
PA.
DUNKIRK
JAMESTOWN
OLEAN
ELLICOTTVILLE
NEW YORK STATE BARGE CANAL
TONAWANDA CREEK
MUD CREEK
BLACK CREEK
OATKA CREEK
BUFFALO CREEK
CAZENOVIA CR.
SAYUGA CREEK
EAST BRANCH
WEST BRANCH
SOUTH BRANCH
EIGHTEENMILE CREEK
CATTARAUGUS CREEK
CLEAR CREEK
CONEWANGO CREEK
L. CONEWANGO
FRENCH CREEK
FINDLEY LAKE
CHAUTAUQUA LAKE
GOOSE CREEK
CASSADAGA LAKES
BEAR LAKE
CASSADAGA CREEK
ALLEGHENY RIVER
VALLEY CREEK
MANSFIELD CREEK
SOUTH BRANCH
OLEAN CREEK
ISHUA CREEK
CUBA LAKE
LIME LAKE
CRYSTAL LAKE
SILVER LAKE
MT. MORRIS RES.
EAST KOY CREEK
WILSON CREEK
CANADEA CREEK
RUSHFORD RES
ALLEN LAKE
BINKER CR.
ANGELICA CREEK
BLACK CREEK
KESHEQUA CREEK
PHILLIPS CREEK
CALDEN CREEK
VANDERMARK CR.
CHENUNDA
KINZUA RESERVOIR
TUNGWANT
POTATO CREEK
BROKEN STRAW CREEK

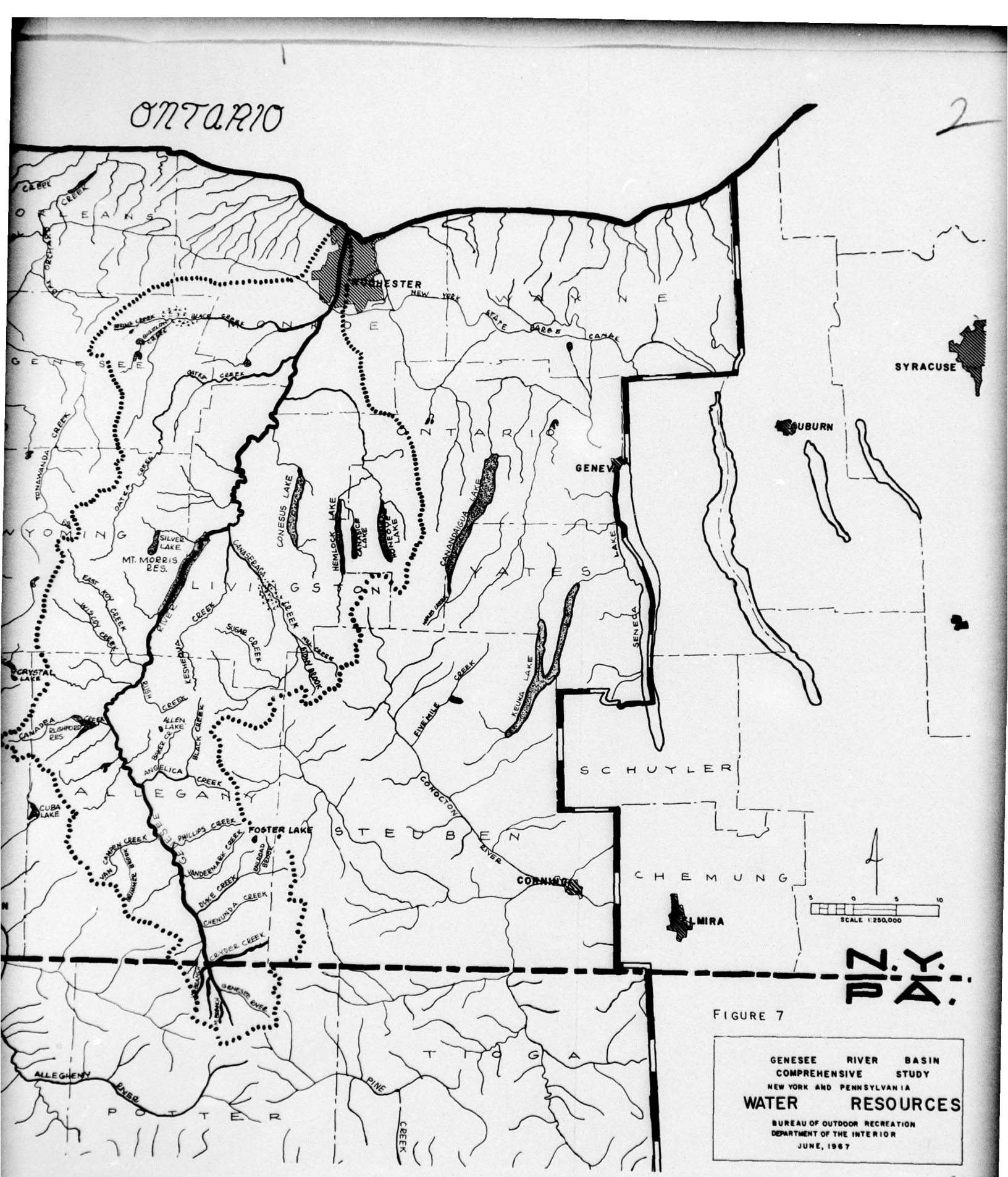
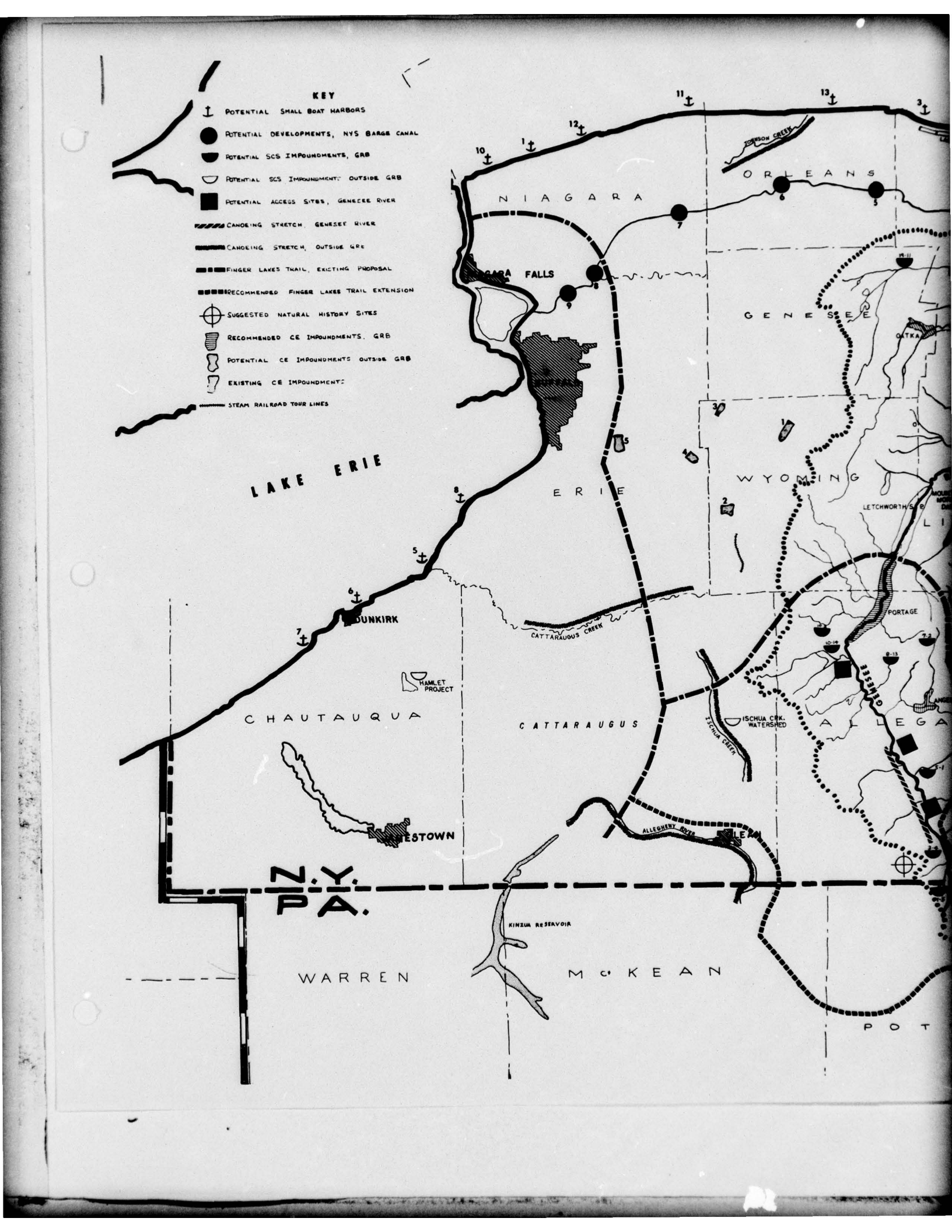


FIGURE 7

GENESEE RIVER BASIN
COMPREHENSIVE STUDY
NEW YORK AND PENNSYLVANIA
WATER RESOURCES
BUREAU OF OUTDOOR RECREATION
DEPARTMENT OF THE INTERIOR
JUNE, 1967

69-70


KEY
POTENTIAL SMALL BOAT HARBORS
POTENTIAL DEVELOPMENTS, NYS BARGE CANAL
POTENTIAL SCS IMPOUNDMENTS, GRB
POTENTIAL SCS IMPOUNDMENTS OUTSIDE GRB
POTENTIAL ACCESS SITES, GENESEE RIVER
CANOEING STRETCH, GENESEE RIVER
CANOEING STRETCH, OUTSIDE GRB
FINGER LAKES TRAIL, EXISTING PROPOSAL
RECOMMENDED FINGER LAKES TRAIL EXTENSION
SUGGESTED NATURAL HISTORY SITES
RECOMMENDED CE IMPOUNDMENTS, GRB
POTENTIAL CE IMPOUNDMENTS OUTSIDE GRB
EXISTING CE IMPOUNDMENTS
STEAM RAILROAD TOUR LINES
LAKE ERIE
NIAGARA
ORLEANS
GENESEE
WYOMING
ERIE
CHAUTAUQUA
CATTARAUGUS
ALLEGA
WARREN
McKEAN
POT
N.Y.
PA.
FALLS
DUNKIRK
JOHNSON CREEK
CATTARAUGUS CREEK
HAMLET PROJECT
ISCHUA CRK. WATERSHED
ISCHUA CREEK
ALLEGHENY RIVER
KINZUA RESERVOIR
LETCHWORTH S.P.
PORTAGE
GENESEE

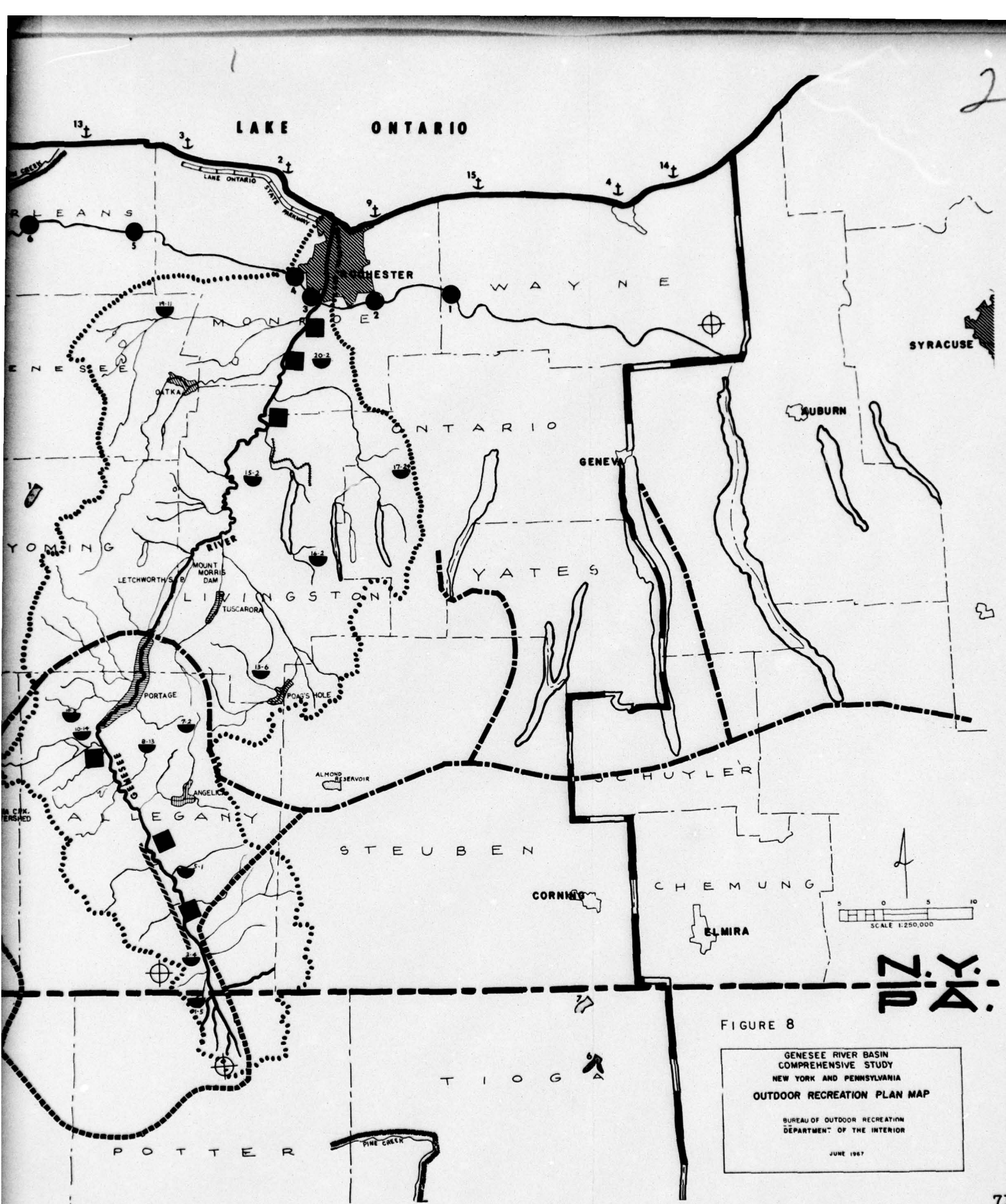


FIGURE 8

GENESEE RIVER BASIN
COMPREHENSIVE STUDY
NEW YORK AND PENNSYLVANIA
OUTDOOR RECREATION PLAN MAP

BUREAU OF OUTDOOR RECREATION
DEPARTMENT OF THE INTERIOR

JUNE 1967

71-72

(2) Scale of Development.

The suggested scale of recreation development of the proposals recommended in this report is contained within the narrative and tables of the Outdoor Recreation Plan. Also, most of the outdoor recreation proposals contain an estimate of use expected on a capacity day (typical summer Sunday) by 1980.

Since the basic confines of the overall study of the Genesee River Basin are limited to the drainage area of the river, the following cost approximation of those recommended projects and sites in the Outdoor Recreation Plan will be limited to the basin. The scale of development of the Portage project including number, type, size and costs of facilities will be presented in detail later.

The cost approximation of the developments in Table 15 is based upon a detailed evaluation of several projects in the Bureau of Outdoor Recreation's Northeast Region. The cost estimates are 45 cents per estimated annual visitation, amortized over 100 years and include interest, replacement of facilities, and operation and maintenance. The costs, however, do not include required lands.

Recommended project and development benefits are also included in ORP Table 15. Benefits range between 50 cents and $1.50 per annual visitor (annual recreation days) depending upon the type and quality of recreation experience provided. Estimated benefits are gross rather than average annual.

(3) Scheduling of Developments.

The development of the outdoor recreation components of the Genesee Study presented are considered as being in place to meet 1980 needs. As a result of the needs analysis in Part III, there are no residual programs or projects recommended toward meeting the market area recreation needs of 2020 in the river basin. The time and funds required for individual authorization of federal, state and local recreation projects will more than likely surpass 1980 before all recommended basin projects could be completed, or the potentials in the market area be fully investigated.

OUTDOOR RECREATION PLAN TABLE 15 - Estimated Costs of Recreation Developments, Genesee River Basin, 1980.

	Annual Visitation (recreation days)	Annual Benefits	Annual Costs
Barge Canal			
Site #3	80,000	$ 60,000	$ 36,000
Site #4	264,000	198,000	118,000
Corps of Engineers			
Angelica	288,000	216,000	129,600
Portage*	1,400,000	2,100,000	7,000,000 (not amortized)
Mt. Morris	87,200	91,800	--
Tuscarora	211,200	158,400	95,000
Poag's Hole	--	--	--
Oatka	1,006,000	754,000	452,700
* (Portage 2020	2,000,000	3,000,000	10,000,000 total development costs not amortized)
Soil Conservation Service			
Site 1-5	82,700	62,000	37,200
3-4	97,300	73,000	43,800
5-1	30,000	22,500	13,500
7-2	160,000	120,000	72,000
8-13	56,000	42,000	25,200
10-2	26,700	20,000	12,000
10-14	30,000	22,500	13,500
13-6	97,200	72,900	43,700
14-2	--	--	--
15-2	72,000	54,000	32,400
16-2	48,700	36,500	21,900
17-24	96,000	72,000	43,200
19-11	900,000	675,000	405,000
20-2	600,000	450,000	270,000
Access Sites, Genesee River			
Upstream 1	28,300	113,200**	12,700
2	28,300	113,200**	12,700
3	28,300	113,200**	12,700
Downstream 1	55,000	41,200	24,800
2	55,000	41,200	24,800
3	55,000	41,200	24,800
Trails and Natural Areas	No estimates		

** Higher benefits based on opportunity for canoeing.

E. Suggested Administrative Arrangement. The objective of this section is to suggest the level of administration of proposed recreation developments in the Genesee River Basin (hence federal, state, local, or other management). The capability of the various administrative levels to finance and operate recreation areas and programs varies widely, as would their future commitments to other programs. Also, the present legislative authority of the various levels, especially local, may require substantial changes prior to participation in an extended outdoor recreation program.

Suggested Administrative Alternatives

	Federal	State	County	Local	Private
Barge Canal Sites (2)		X		X	X
Corps of Engineers					
Angelica		X			
Portage*	X	X			
Tuscarora		X			
Oatka		X	X		
Soil Conservation Service					
1-5		X	X		
3-4		X	X		
5-1				X	X
7-2		X			
8-13		X	X		
10-2					X
10-14					X
13-6			X		X
14-2			X	X	
15-2		X			
16-2				X	X
17-24		X	X		
19-11				X	
20-2				X	
Access Sites, Genesee River					
Upstream (3)			X	X	
Downstream (3)		X	X		
Trails					
Finger Lakes System additions					X
Associated with other developments	(same as managing agency for site)				
Natural Areas					
"3-Rivers Rise"		X			
Alma Pond					X
Wayne County Sanctuary (outside Genesee Basin)					X

*May require partial Federal management especially reservoir project operation. The significance of a Letchworth-Portage combined development may be conducive to a joint State-Federal operation.

Part VI Evaluation.

The Portage Dam and Reservoir proposal with the primary project purposes of hydroelectric power, water quality control, and recreation was the only Corps of Engineers' site recommended by the Plan Formulation Task Group #12. The following analysis of recreation benefits and facilities costs is based upon the proposed engineering design plan and operation of the dam and reservoir as recommended by Task Group #12.

A. Benefits. (1) Tangible. Recreation benefits consist of the value of the amount of recreation use expected at the project if developed to provide a maximum of high quality recreation opportunity. Senate Document 97, Supplement 1, "Evaluation Standards for Primary Outdoor Recreation Benefits," was utilized to select the value of a recreation day at the project. In considering the general and specialized outdoor recreation opportunity that is expected to be provided, the value of $1.50 per recreation or visitor was selected. Estimates of annual visitation were made for 1980 (initial) and the year 2020 (ultimate). Average annual benefits were computed by the Corps of Engineers. ORP Table 16 presents the tangible recreation benefit analyses.

OUTDOOR RECREATION PLAN TABLE 16 - Outdoor Recreation Benefits, Portage Dam and Reservoir, Genesee River Basin.

Year	Expected Annual Visitation (Recreation Days)	Value per Recreation Day	Annual Benefits	Average Annual Benefits
1980	1,400,000	$1.50	$2,100,000	$2,100,000
2020	2,000,000	1.50	3,000,000	2,608,000

(2) Intangible. Intangible benefits accrue from the development or protection of the aesthetic, scenic, historic, scientific, and social values of the project and its immediate environment. The intangible benefits expected from the Portage project were not assigned a monetary value, but certain of these benefits weighed heavily in favor of recreation during plan formulation.

The preservation and protection of the scenic qualities of the Portage reservoir project area were considered uppermost during plan formulation, especially in view of the project's location adjacent to Letchworth State Park. The proposed design and operation of the project not only ensured an adequate release of water over the falls in Letchworth State Park, but also provided a larger pool for potential recreation use of Mt. Morris reservoir.

Tentative plans for construction of hydroelectric power generation facilities call for most of the structures to be placed underground. Although not evaluated, the design and location of such a plant could attract substantial visitation.

The proposed acquisition of lands described in Appendix M, "Recreation," provides for the integrated management of the reservoir with Letchworth State Park. Development of reservoir project lands will be in keeping with the present high quality of facilities at Letchworth Park.

The scenic location and scope of the Portage project combined with the State Park will provide substantial opportunity for private investment in quality services and facilities to enlarge upon and enhance the total recreation experience of visitors to the area.

B. Costs. ORP Table 17 presents the estimated number and capital costs of recreation facilities for the proposed Portage project. However, the Table does not include the cost of lands attributed jointly to the project or those lands which may be separable cost items for recreation (or fish and wildlife conservation).

The Corps of Engineers will determine the average annual costs of the recreation component of the Portage project. This determination will become a part of the overall cost/benefit analysis of the project in considering all project purposes.

OUTDOOR RECREATION PLAN TABLE 17 - Recreation Cost Allocation, Portage Reservoir, Genesee River Basin.

	Annual Visitation	Daily Capacity	Design Load
1980	1,400,000	32,900	26,320
2020	2,000,000	47,000	37,600

1980 Design Loads

Activity	Percent of Activity Days	Activity Days Per Design Day		Daily Turnover	Design Load	
		1980	2020		1980	2020
Boating	10	3,290	4,700	1	3,290	4,700
Picnicking	30	9,870	14,100	2	4,935	7,050
Camping	20	6,580	9,400	1	6,580	9,400
Swimming	40	13,160	18,800	1.5	8,770	12,530
Hiking and Nature Study	10	3,290	4,700	3	1,100	1,570
Sightseeing	50	16,450	23,500	10	1,645	2,350
	160	52,640	75,200	2	26,320	37,600

Initial Recreation Facilities and Costs (100-year project life @ 3-1/8% interest)

1. Boating. Design Load - 3,290 ÷ 4 = 820 boats

Assign 1/4 to a marina, or 210 boats
Assign 3/4 to other launchings, or 610 boats
Launching 610 boats, assume 60 per lane, or 10 lanes
Assume construction of double lanes, or 5 ramps

Each double ramp @ $12,000	$ 60,000
Boat dock - 1 per double ramp - @ $5,000	25,000
Car-trailer parking - 610 units, bituminous pads @ $165 (assume 75 units/acre, or 8.13 acres)	100,600
Marina - to handle 210 boats, service center, concession establishment, parking	500,000
Total Boating	$685,600

2. Picnicking. Design Load - 4,935 ÷ 5 = 990 tables

10 shelters @ 40 persons or 8 tables = 80 tables

990 tables - 80 tables = 910 (or 900) @ $125		$112,500
10 shelters @ $10,000		100,000
(Picnicking facilities include fireplaces, refuse cans)	Total Picnicking	$212,500

3. Camping. Design Load - 6,580 ÷ 5 = 1,300 units
(A unit consists of 1 table, 1 fireplace, refuse can, and site preparation; includes sanitation and bituminous access)

1,300 units @ $1,500		$1,950,000
Add possible small campground shelters and play areas		50,000
	Total Camping	$2,000,000

4. Swimming. Design Load - 8,770

70% on beach, or 6,140; 50 ft.^{2} per person = 307,000 ft.^{2} or 7 acres beach

307,000 ft.^{2} @ $1.25 per ft.^{2}		$384,000
(Includes change houses, backup site preparation)		
	Total Swimming	$384,000

5. Hiking, walking, nature study.

Assume 1 mile of trail for each 50,000 annual visitors, or 1,400,000 ÷ 50,000 = 28 miles @ $7,900 per mile		$221,200
(Note - miles are a measuring integer only; costs would include small shelters, rest areas, overlooks, interpretation; hence total miles (28) may be substantially less.		
	Total Hiking - Nature Study	$221,200

6. Parking (general). Total Design Load (26,320) less boat parking design load (3,290) = 23,030.

23,030 ÷ 4 = 5,760 spaces @ $100		$576,000
	Total General Parking	$576,000

7. Signs and Landscaping.

Total Design Load (26,320) x $1.75	$ 46,000
Total Signs and Landscape	$ 46,000

8. Sanitation (general).

Total Design Load (26,320) - 320 per unit =	
82 units @ $9,500	$779,000
Total Sanitation	$779,000

9. Water (general).

Total Design Load (26,320) - 75 per unit =	
350 units @ $1,200	$420,000
Total Water	$420,000

10. Roads.

General bituminous surface park access roads less those access roads required for dam and reservoir project maintenance, and less those existing roads within the project acquisition boundary. Also, within items 1 through 9 are included entry spur roads and general parking flats.

Lump sum allowed - $500,000 @ $60,000/mile = 8.3 miles	
Total Roads	$500,000

11. Administrative Unit

Lump sum allowed	$ 25,000
Subtotal	$5,849,400
12. Planning, Overhead and Contingencies @ 20%	$1,169,880
Total	$7,019,280*

Ultimate Recreation Facilities and Costs

1. Boating. Add 6 lanes or 3 ramps		$36,000
Add 3 boat docks		15,000
Car-trailer parking - 360 units (4.8 acres)		58,600
Total boating		$109,600
2. Picnicking. Add 380 tables		$47,500
Add 5 shelters		50,000
Total picnicking		$97,500
3. Camping. Add 580 units		$870,000
Total camping		$870,000
4. Swimming. Add 130,680 ft.^{2} of beach or 3 acres		$163,400
Total swimming		$163,400
5. Parking (general). Add 2,730 spaces		$273,000
Total parking		$273,000
6. Sanitation (general). Add 35 units		$332,500
Total sanitation		$332,500
7. Water (general). Add 150 units		$180,000
Total water		$180,000
8. Roads. Lump sum $500,000 or 8.3 miles		$500,000
Subtotal		$2,526,000
9. Planning, Overhead, and Contingencies @ 20%		$505,200
Total		$3,031,200*

* Note. Major replacements based on renewal each 25 years of total net recreation project costs. Annual operations and maintenance costs estimated to be $ .30 per annual recreation day based on average annual visitation.

Part VII Views of Other Interests.

When obtained, the views and interests of concerned agencies and groups, both public and private, will be appended to this report.

Part VIII Conclusions.

Based upon the reported current and future aspects of outdoor recreation in the Genesee River Basin and its zone of program influence, the following conclusions are offered.

(1) The natural recreation resources of the Genesee Basin and its market area provide a wide variety of opportunity for development, enhancement, and preservation. Public and privately-operated areas and facilities currently offer an extensive and diversified recreation program for residents and non-residents alike.

(2) State, county, and local governments, as well as private industry, in the Genesee River Basin and surrounding areas, are sensitive to the need for and encourage the development of outdoor recreation opportunity.

(3) The 1960 population of the market area will nearly double by the year 2020; more than double in the area's metropolitan counties.

(4) Boating, camping, picnicking, and swimming, four activities which are either directly related to or enhanced by water were considered key activities since they constitute a convenient index to the type and scale of development required to accommodate the majority of water-oriented recreation uses.

(5) Outdoor recreation demand in terms of recreation days will more than quadruple over the period 1960 to 2020. Present and projected supply are insufficient to meet this demand, especially for the water-oriented activities of boating and swimming.

(6) It was concluded that 1980 was the year for which a critical assessment of needs should be made because presently known public and private recreation programs and proposals can reasonably be expected to materialize by 1980, and demand and supply projections tend to be more reliable for the period 1960-80 than for 1980 to 2000 or 2020.

(7) A comparison of the demand for and the supply of facilities on a capacity day during a week (typical summer Sunday) reflects more adequately outdoor recreation needs than a similar comparison on an annual or seasonal basis.

(8) If developed by 1980, the total resources of the Genesee Basin and market area, especially the Corps of Engineers' potential reservoir projects and their proposed small boat harbors on Lakes Erie and Ontario, would provide a significant impact on the overall computed needs for land and water.

(9) The identification and assessment of resources in the Genesee Basin and its recreation market area represents a reasonable measure of the outdoor recreation potential these resources could achieve. That all potential impoundments were not recommended in spite of demonstrated needs represents resource planning judgment as well as individual project feasibility.

(10) The resource developments contained in the Outdoor Recreation Plan for the Genesee River Basin are considered practical proposals to provide as much opportunity for a variety of water-oriented or water-enhanced outdoor recreation activities as possible, consistent with the capability of the resource and the needs identified in this report.

(11) Current concepts of water resource development feature the advantages of outdoor recreation opportunities brought about by artificial reservoirs and natural water courses. In consideration of our present ability to forecast the magnitude and direction of recreation demand, there is no urgent need to alter these concepts where developments are expected to materialize by 1980. There is, however, an urgent need for research in humanities to better enable us to predict future patterns of recreation. For instance, per capita participation rates for the selected key activities may become less than that predicted as a result of expanding interest in other activities. Also, general aspirations of the future recreating public may be entirely different than they are today. Hence, the scope of activities identified in this report as key planning elements may change at some point in the future. In all likelihood, there will be a significant increase in the number of persons seeking to acquire a special skill or expertise in an individual outdoor activity. As such, additional pressure may be exerted to promote the development of certain areas exclusively to this activity. Such development does not have to be generally discouraged, in fact, it may offer added opportunity for private enterprise, especially if it is assumed that publicly-owned land on an acres per capita basis will steadily decrease by the year 2020.

Part IX Recommendations.

The following recommendations form a suggested action program to implement the outdoor recreation development plan for the water and related land resources of the Genesee River Basin.

(1) The Corps of Engineers and Soil Conservation Service water resource development programs recommended in the outdoor recreation plan should include recreation as a project purpose.

(2) Development of the potential recreation resources of the Corps of Engineers' Portage reservoir project, in association with adjacent Letchworth State Park, is the focal point of the basin-wide outdoor recreation plan. This project should be implemented as soon as possible.

(3) Several proposed impoundments identified by the Soil Conservation Service offer significant opportunity for state, local, and private development complementary to the Letchworth-Portage project. It is recommended that the Soil Conservation Service seek sponsorship for these projects as single purpose recreation or multiple purpose recreation--fish and wildlife conservation sites as proposed in the outdoor recreation plan. Priority should be afforded Sites 7-2, 19-11, and 20-2.

(4) The ten year action program of the New York Statewide Comprehensive Outdoor Recreation Plan which presently includes development of 28 boating access sites in the western part of the state should be expanded to take advantage of the suggested improvements for boating opportunity in the basin and to enlarge upon and enhance the total outdoor recreation experience envisioned in the Outdoor Recreation Plan for the Genesee River. It is recommended that an expanded New York Plan contain development of two recreation sites on the New York State Barge Canal within the basin and six small access areas on the Genesee River.

(5) The Finger Lakes Trail branch from Allegany State Park through Portageville to Bath is recommended for sponsorship and completion and should be routed to the proposed site of the Portage Dam.

(6) There should be an extension of the Finger Lakes Trail from near Almond Reservoir at Hornell to the headwaters of the Genesee River.

(7) The potential North Country National Scenic Trail has been proposed by the Bureau of Outdoor Recreation.[1] It is recommended that a portion of this Trail pursue a route from the headwaters

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1. Trails for America, Bureau of Outdoor Recreation, U.S. Department of the Interior, 1966, pp 75 and 81. See also: S827, HR4865 90th Congress 1st Session - duplicate bills to establish a nationwide system of trails, and for other purposes.

of the Genesee River northwesterly along the Allegheny River to join the Conservation Trail in Allegany State Park. Such a proposal has international significance since the Conservation Trail connects with the Bruce Trail of Canada at Queenston, Ontario.

(8) It is recommended that the "3-Rivers Rise" area which would include the headwaters of the West Branch of the Susquehanna, Genesee, and Allegheny Rivers should be identified and considered for preservation in its natural state. The area should be included in the action program of the Pennsylvania Statewide Outdoor Recreation Plan.

APPENDIX A

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APPENDIX TABLE A1 - Summary of Demand for Four Outdoor Recreation Activities, Summer Season and Typical Summer Sunday - 1960, 1980, 2000, and 2020. (Numbers in Thousands of Activity Days.)

	Summer Season				Typical Summer Sunday			
	1960	1980	2000	2020	1960	1980	2000	2020
Boating								
Metro. Areas	2,533.7	5,393.6	9,061.3	12,614.9	77.7	158.2	265.7	364.3
Barge Canals	136.7	264.8	462.0	626.0	4.2	7.8	13.5	18.0
Central Plains	293.9	562.9	837.3	1,249.8	9.0	16.6	24.5	36.1
Alleg. Plateau	696.8	1,249.0	1,987.9	2,512.6	21.1	36.6	58.4	72.7
Total	3,661.1	7,470.3	12,348.5	17,003.3	112.0	219.2	362.1	491.1
Camping								
Metro. Areas	486.4	2,094.0	4,610.8	7,793.6	12.6	33.0	97.6	164.9
Barge Canal	26.0	102.8	235.2	386.6	0.6	1.6	5.0	8.2
Central Plains	56.2	218.8	426.0	772.0	1.4	3.5	9.0	16.6
Alleg. Plateau	133.7	484.0	1,011.6	1,552.4	3.4	7.8	21.4	32.9
Total	702.3	2,899.6	6,283.6	10,504.8	18.0	45.9	133.0	222.6
Picnicking								
Metro. Areas	5,377.0	9,648.3	14,159.4	18,940.0	165.4	296.8	435.4	582.8
Barge Canal	290.1	473.8	721.9	940.1	8.9	14.6	22.2	28.9
Central Plains	623.4	1,007.3	1,308.2	1,876.7	19.0	31.0	40.2	57.8
Alleg. Plateau	1,478.0	2,234.4	3,106.4	3,772.2	45.4	68.6	95.5	116.1
Total	7,768.5	13,363.8	19,295.9	25,529.0	238.7	411.0	593.3	785.6
Swimming								
Metro. Areas	11,908.4	23,379.7	37,820.6	53,694.9	371.6	705.6	1,135.0	1,596.3
Barge Canal	642.1	1,148.2	1,928.3	2,665.1	20.0	34.6	57.8	79.3
Central Plains	1,380.5	2,440.3	3,494.3	5,319.3	42.9	73.7	104.9	158.2
Alleg. Plateau	3,273.2	4,705.1	8,297.3	10,694.3	101.9	163.4	249.1	317.9
Total	17,204.2	31,673.3	51,540.5	72,373.6	536.4	977.3	1,546.8	2,151.7

APPENDIX TABLE A2 - Recapitulation of Demand, Supply, and Needs in Recreation Days, Genesee River Basin Recreation Market Area - 1960 to 2020 (numbers in thousands).

	Summer Season			Typical Summer Sunday		
	Demand	Supply	Needs	Demand	Supply	Needs
1960						
Metro. Areas	14,968.9	6,354.6	8,614.2	467.1	122.2	344.9
Barge Canal	815.4	0.7	814.7	25.3	-	25.3
Central Plains	1,753.1	192.8	1,560.3	54.3	4.1	50.2
Alleg. Plateau	4,156.6	2,088.7	2,067.9	66.6	40.4	26.2
Market Area	21,694.0	8,636.8	13,057.1	613.3	166.7	446.6
1980						
Metro. Areas	29,388.3	17,429.4	11,958.9	886.9	420.9	466.0
Barge Canal	1,479.4	1,443.2	36.2	44.4	34.2	10.2
Central Plains	3,144.4	2,239.7	904.7	94.5	53.8	40.7
Alleg. Plateau	6,233.9	5,229.9	1,004.0	209.4	125.5	83.9
Market Area	40,246.0	26,342.2	13,903.8	1,235.2	634.4	600.8
2000						
Metro. Areas	47,540.5	21,786.7	25,753.8	1,426.7	421.0	1,005.7
Barge Canal	2,502.6	1,804.1	698.5	74.6	34.2	40.4
Central Plains	4,535.2	2,799.9	1,735.3	135.5	53.8	81.7
Alleg. Plateau	10,768.6	6,537.3	4,231.3	322.0	125.6	196.4
Market Area	65,346.9	32,928.0	32,418.9	1,958.8	634.6	1,324.2
2020						
Metro. Areas	67,494.5	27,233.4	40,261.1	2,006.6	421.0	1,585.6
Barge Canal	3,445.8	2,255.1	1,190.7	101.9	34.2	67.7
Central Plains	6,877.8	3,499.9	3,377.9	203.4	53.8	149.6
Alleg. Plateau	13,827.6	8,171.6	5,656.0	409.0	125.6	283.4
Market Area	91,645.7	41,160.0	50,485.7	2,720.9	634.6	2,086.3

APPENDIX TABLE A3. PHASE I SUPPLY, PUBLIC OUTDOOR RECREATION AREAS – 1960 AND 1980-PROJECTED SUMMER SEASON CAPACITY IN ACTIVITY DAYS FOR SELECTED WATER-ORIENTED ACTIVITIES — GENESEE RIVER BASIN RECREATION MARKET AREA.

INDEX NO.	COUNTY	LEVEL OF ADMIN.	NAME OF AREA	ACRES	ACRES WATER IN OR ADJACENT	1963 OR RECENT VISITATION	1960 CAPACITY				PROJECTED 1980 CAPACITY				REMARKS
							BOAT	CAMP	PICNIC	SWIM	BOAT	CAMP	PICNIC	SWIM	
	ALLEGANY, N.Y.														
A 1		S	CUBA RESERVATION STATE PARK	678	560	67,000	2,400		7,300	32,500	2,800		67,300	37,400	GROUP CAMP
A 2		S	HANGING BOG G.M.A.	4,341	5			200	1,500			200	1,700		
	CATTARAUGUS														
C 3		S	ALLEGANY STATE PARK	65,000	120	691,500		120,200	146,200	117,000	28,100	373,800	269,100	134,500	KINZUA DAM ASSOCIATION
	CHAUTAUQUA														
CH 2-1		S	BARCELONA B/L SITE (UNDEV.) (BARCELONA HARBOR)	1			7,400				8,600				
CH 8		S	BEMUS POINT B/L SITE	1			1,000				10,700				
CH 4		S	CANADAWAY CREEK G.M.A.	2,180	5			NO EST.	5,800			NO EST.	6,700		
CH 6		S	CHAUTAUQUA FISH HATCHERY	70	1,000+	16,000			2,000				2,200		
CH 9		S	DUNKIRK B/L SITE	6			11,700				13,500				
CH 3		S	LAKE ERIE STATE PARK (UNDEV.)	355	1,000*	88,000	12,200	5,700	58,500	117,000	14,000	56,100	84,100	134,500	ACCESS TO LAKE ERIE
CH 7		S	LONG POINT ON LAKE CHAUTAUQUA STATE PK	322	1,000*						25,100		67,300	123,300	ON LAKE CHAUTAUQUA
CH 5		S	PRENDERGAST POINT B/L SITE (UNDEV.)	4	1,000*		11,700		3,500		13,500		4,000	POTENTIAL	
S		L	JAMESTOWN (SUMMARY)	179	6	86,000				870,700				1,001,300	ACTIVE/PASSIVE PURSUITS
		L	ALLEN PARK	35	1	73,000				160,800				184,900	" " "
		L	BERGMAN PARK	79		54,750									" " " PROGRAMMED
		L	JONES PARK	60	100	12,750					POTENTIAL		POTENTIAL	POTENTIAL	" " "
	ERIE														
E 3		S	BEAVER ISLAND STATE PARK	918	1,000+	630,010			292,500	233,900			336,300	269,000	ACCESS TO LAKE ONTARIO, GOLF
E 1		S	BUCKHORN ISLAND STATE PARK	896	1,000*	112,600							10,700		GAME REFUGE
E 11		S	EVANGOLA STATE PARK	701	1,000+	213,160		4,900	292,500	536,100	126,100	14,900	336,300	616,500	ACCESS TO LAKE ERIE
E 2		S	BIG SIX-MILE CREEK BOAT BASIN	19	1,000+	UNKNOWN	11,700		1,600		13,500		1,900		BOAT DOCK RENTAL
E 7		C	AKRON FALLS COUNTY PARK	137	11*	262,897			263,300				302,700		
E 12		C	CHESTNUT RIDGE COUNTY PARK	1,200	12*	868,760			702,000			74,800	807,200		ACTIVE PURSUITS INCL. WINTER SPORTS
E 8		C	COMO LAKE COUNTY PARK	325	23*	602,996			224,300				257,900		ACTIVE PURSUITS
E 5		C	ELLICOTT CREEK COUNTY PARK	165	27*	560,670			250,200				287,800		RECREATION LIMITED
E 9		C	ELMA MEADOWS CO. PARK & GOLF COURSE	204	13*	53,864			21,900				25,200		ACTIVE PURSUITS
E 10		C	EMERY COUNTY PARK	331	5*	559,220			277,900				319,500		" "
E 4		C	ISLE VIEW COUNTY PARK	53							PLANNED				
S		L	BUFFALO (SUMMARY)	228	UNKNOWN	3,600,000	4,700		292,500	877,200	15,900		367,000	1,176,900	ACTIVE PURSUITS; VISITS TO ALL PARKS
		L	CAZENOVIA PARK	204	20	INCL. ABOVE			NO EST.	NO EST.			NO EST.	PROGRAMMED	ACTIVE PURSUITS
		L	DELAWARE PARK	359	30	INCL. ABOVE			NO EST.		POTENTIAL	POTENTIAL	NO EST.	PROGRAMMED	ACTIVE PURSUITS; ZOO
		L	FRONT PARK	23	1,000+	INCL. ABOVE	13,000		NO EST.		14,900		NO EST.	PROGRAMMED	ACTIVE PURSUITS
		L	GROVER CLEVELAND PARK	112		INCL. ABOVE			NO EST.				NO EST.		ACTIVE PURSUITS

INDEX NO	COUNTY	LEVEL OF ACTION	NAME OF AREA	ACRES	ACRES WATER IN OR ADJACENT	1963 OR RECENT VISITATION	1960 CAPACITY BOAT	1960 CAPACITY CAMP	1960 CAPACITY PICNIC	1960 CAPACITY SWIM	PROJECTED 1980 CAPACITY BOAT	PROJECTED 1980 CAPACITY CAMP	PROJECTED 1980 CAPACITY PICNIC	PROJECTED 1980 CAPACITY SWIM	REMARKS
	ERIE (CONT.)	L	HOUGHTON PARK	53		INCL. ABOVE			NO EST.	NO EST.			NO EST	NO EST.	ACTIVE PURSUITS
		L	HUMBOLDT PARK	56		INCL. ABOVE			NO EST.	NO EST.			NO EST.	NO EST.	ACTIVE PURSUITS
		L	LASALLE PARK	34	1,000+	INCL. ABOVE	NO EST		NO EST.	NO EST.	NO EST.		NO EST	NO EST	ACTIVE PURSUITS
		L	RIVERSIDE PARK	37	1,000+	INCL. ABOVE			NO EST.	NO EST	POTENTIAL		NO EST	NO EST.	ACTIVE PURSUITS
		L	SCHILLER PARK	37		INCL. ABOVE			NO EST.	NO EST.			NO EST	NO EST	ACTIVE PURSUITS
		L	SOUTH PARK	155	25	INCL. ABOVE			NO EST.			POTENTIAL	NO EST	PROGRAMMED	ACTIVE PURSUITS; BOTANICAL GARDENS
		L	SQUAW ISLAND DUMP SITE (POTENTIAL)	30	1,000+								NO EST.		ACTIVE/PASSIVE PURSUITS
	GENESEE														
G 2		S	DARIEN LAKES STATE PARK (UNDEV.)	1,230	10	N/A						93,400	373,700	684,900	AN INTERIOR PARK
G 1		S	OAK ORCHARD G.M.A.	2,500		UNKNOWN			2,400				2,700		
G 3		S	TONOWANDA G.M.A.	2,732		UNKNOWN						POTENTIAL	2,100		ADD CONSIDERABLE ACREAGE
	LIVINGSTON														
L 1		S	CALEDONIA FISH HATCHERY	66		35,000			1,500				1,800		PICNICKING INCIDENTAL
L 5		S	CONESUS LAKE B/L SITE	3	1,000+	UNKNOWN	18,700				21,500				
L 2-(3)		S	LETCHWORTH STATE PK. (MOUNT MORRIS DAM)	18,800	SEE REMARKS	666,000		48,800	433,100	130,000		256,900	495,000	149,500	MOUNT MORRIS DAM ASSOCIATED
L 4		S	RATTLESNAKE HILL G.M.A	5,119		UNKNOWN			1,100			PROGRAMMED	1,300		GROUP CAMPING
	MONROE														
M 1		S	HAMLIN BEACH STATE PARK	1,118	1,000+	281,700			260,000	362,800	121,500	93,300	299,000	538,000	ACCESS TO LAKE ONTARIO
M 3		S	BRADDOCK BAY STATE PARK	2,115	1,000+	20,000	69,900		13,000		116,800		312,100	571,600	NEAR ROCHESTER
M 11		S	BUSHNELL BASIN MULTIPLE USE AREA	30	100-	UNKNOWN				1,100				1,200	
M 7		C	CHURCHVILLE COUNTY PARK	644		850,000			39,800				58,900	108,300	ACTIVE PURSUITS
M 5		C	DURAND-EASTMAN COUNTY PARK	594	30+	950,000			21,900	725,600			50,500	834,400	ACTIVE PURSUITS
M 10		C	ELLISON COUNTY PARK	378		750,000			34,900				50,500		ACTIVE PURSUITS
M 8		C	GENESEE VALLEY COUNTY PARK (EAST)	587	100-	900,000			87,800				117,700		ACTIVE PURSUITS
M 13		C	HIGHLAND COUNTY PARK	120	1	250,000			4,100				5,100		PASSIVE PURSUITS
M 9		C	MENDON PONDS COUNTY PARK	1,729	166	600,000			25,200	145,100		18,700	58,900	333,800	NATURE PRESERVE; GAME FARM
M 4		C	ONTARIO BEACH COUNTY PARK	35	1,000+	619,000			73,100	1,451,300			84,100	1,668,800	ACTIVE PURSUITS
M 12		C	POWDER MILL COUNTY PARK	301		400,000			38,200				46,700		ACTIVE PURSUITS; FISH HATCHERY
M 14		C	SENECA COUNTY PARK	277		600,000			21,900	275,100			25,200	316,800	ZOO
M 6		C	WEBSTER BEACH COUNTY PARK	547	1,000+	100,000			43,900	86,600		33,600	77,500	99,600	ACTIVE PURSUITS; NATURE STUDY
S		L	ROCHESTER (SUMMARY)	225		1,356,400			29,300	NO EST.			33,600	NO EST.	ACTIVE PURSUITS
		L	EDGERTON PARK	32		115,781			NO EST.				NO EST.		ACTIVE PURSUITS
		L	GENESEE VALLEY PARK (WEST)	87	100-	189,584	NO EST.				NO EST.				ACTIVE PURSUITS
		L	MAPLEWOOD PARK	110	3	98,732			NO EST.				NO EST.		ACTIVE PURSUITS
		L	TRYON PARK (UNDEV.)	45		N/A							POTENTIAL		ACTIVE PURSUITS IN EXPANSION
	NIAGARA														
N 10		S	DEVIL'S HOLE STATE PARK	42.		275,350			2,400		27,100		2,700		HIGHWAY REST AREA

H INDEX NO.	COUNTY	LEVEL OF ACTIVITY	NAME OF AREA	ACRES	ACRES WATER IN OR ADJACENT	1963 OR RECENT VISITATION	1960 CAPACITY BOAT	1960 CAPACITY CAMP	1960 CAPACITY PICNIC	1960 CAPACITY SWIM	PROJECTED 1980 CAPACITY BOAT	PROJECTED 1980 CAPACITY CAMP	PROJECTED 1980 CAPACITY PICNIC	PROJECTED 1980 CAPACITY SWIM	REMARKS
N 1	NIAGARA (CONT.)	S	FORT NIAGARA STATE PARK (UNDEV.)	504	1,000+	N/A					27,100		72,000	132,000	ACCESS TO LAKE ONTARIO
N 2		S	FORT NIAGARA STATE PARK-4 MILE ANNEX	248	1,000+	54,950		39,000	38,000	39,000	9,300	56,100	50,500	44,800	
N 5		S	GOLDEN HILL STATE PARK (UNDEV.)	378	1,000+	5,900	7,800	16,200			9,000	37,300		274,000	ACCESS TO LAKE ONTARIO
N 11		S	LEWISTON STATE PARK	9	UNKNOWN	UNKNOWN					4,700		2,800		
N 6		S	LOWER NIAGARA STATE PARK (UNDEV.)	261		N/A			7,300				8,400	16,200	ACCESS TO NIAGARA RIVER
N 16		S	NIAGARA RESERVATION STATE PARK	433	1,000+	4,348,700			14,600				16,800		PRIMARILY SIGHTSEEING
N 20		S	NORTH TONOWANDA B/L SITE	11	1,000+	UNKNOWN (1965)	22,800				26,200				
N 7		S	RESEVOIR STATE PARK	134		27,000							82,200	150,700	ACTIVE PURSUITS
N 8		S	WILSON-TUSCARORA STATE PK. (UNDEV.)	260	1,000+	N/A					4,700		14,600	22,400	
N 15		S	WHIRLPOOL STATE PARK	109		546,500			29,300				33,600		PRIMARILY SIGHTSEEING
N 9		C	CANAL EAST COUNTY PARK (UNDEV.)	25		N/A					9,300		8,400		MARINA PROGRAMMED
N 18		C	CANAL WEST COUNTY PARK	26		23,000	15,600		15,600		17,900		25,200		
N 4		C	KRULL COUNTY PARK	77		10,000			351,000				740,000	896,700	
N 13		C	OPPENHEIM COUNTY PARK	75		10,000			34,900				61,300		
N 14		C	NIAGARA COUNTY GOLF COURSE	376		42,616			4,400				5,000		PRIMARILY GOLF COURSE
S		L	NIAGARA FALLS (SUMMARY)	165	NO EST.	208,000			NO EST.	321,600			NO EST.	370,000	ACTIVE PURSUITS
		L	CENTER COURT PARK	15		50,000			NO EST.				NO EST.		ACTIVE PURSUITS
		L	GRIFFON PARK	20	1,000+	2,000	NO EST.				NO EST.		PROGRAMMED		PARTIALLY DEVELOPED
		L	HYDE PARK	470	100-	740,000			NO EST	NO EST.			NO EST.	NO EST.	ACTIVE PURSUITS; GOLF
		L	JAYNE PARK	22	1,000+	40,000	NO EST.		NO EST.		NO EST.		NO EST.	NO EST.	
	ONTARIO														
O 1		S	CANANDAIGUA LAKE B/L SITE	4	1,000+	NO EST.	21,100				24,300				
O 3		S	HARRIET SPENCER MEM'L. RECRE. AREA	678		NO EST.						56,100	224,200		
O 4		S	HONEOYE LAKE B/L SITE	4	1,000+	NO EST.	7,000				8,000				
O 7		S	NAPLES CREEK RECRE. AREA (UNDEV.)	57	100-	N/A									NO ESTIMATE OF DEVELOPMENTS
O 6		C	ONTARIO COUNTY PARK	400		7,000			10,600			48,600	60,200	199,500	NEW COUNTY PARK
	ORLEANS														
OR 2		F	IROQUOIS NAT'L. WILDLIFE REFUGE	10,800	20	32,442									PRIMARILY NATURE STUDY
OR 1		S	LAKESIDE BEACH STATE PARK (UNDEV.)	642	1,000+	1,000					121,400	93,400	323,300	591,600	ACCESS TO LAKE ONTARIO
	STEUBEN														
ST 2		S	BATH FISH HATCHERY	16		4,000			1,800				2,100		RECREATION INCIDENTAL
ST 5		S	ERWIN G.M.A.	2,504		NO EST.		NO EST.	4,400			NO EST.	5,000		
ST 1		S	STONY BROOK STATE PARK	554		143,119		22,500	112,900	46,600		56,100	171,900	53,600	
ST 3		C	ALMOND RESERVOIR	786	NO EST.						7,000	4,700	18,700	34,200	LEASED FROM CORPS OF ENGINEERS
	WAYNE														
WA 1		S	CHIMNEY BLUFFS STATE PARK (UNDEV.)	596	1,000+	N/A					140,100	93,400	151,400	277,700	ACCESS TO LAKE ONTARIO
WA 2		S	WAYNE COUNTY WETLANDS	3,758	1,000+	NO EST.		700			1,300	PROGRAMMED	3,400		PRIMARILY HUNTING USE

INDEX NO.	COUNTY	LEVEL OF ADMIN.	NAME OF AREA	ACRES	ACRES WATER IN OR ADJACENT	1963 OR RECENT VISITATION	1960 CAPACITY BOAT	1960 CAPACITY CAMP	1960 CAPACITY PICNIC	1960 CAPACITY SWIM	PROJECTED 1980 CAPACITY BOAT	PROJECTED 1980 CAPACITY CAMP	PROJECTED 1980 CAPACITY PICNIC	PROJECTED 1980 CAPACITY SWIM	REMARKS
	WYOMING														
W 2		S	SILVER LAKE RECREATION AREA (UNDEV.)	10	1,000-	N/A					8,400		134,500		
W 3		S	SILVER LAKE STATE PARK	483	30	3,800			1,500		3,600		41,900		
	YATES														
Y 2		S	HIGH TOR G.M.A.	3,643	1,000*	NO EST.			2,400			POTENTIAL	2,700		GROUP CAMP
Y 5		S	KEUKA LAKE B/L SITE	1	1,000*	NO EST.	7,300				8,400		22,400		
Y 4		S	KEUKA LAKE STATE PARK (UNDEV.)	620	1,000*	620			7,300		78,500	93,400	210,200	384,800	NEW PARK SITE
Y 1		S	SOUTH HILL M.U. AREA	848		NO EST.						POTENTIAL	2,700		GROUP CAMPING
	Mc KEAN, PA.														
Mc 1		F	ALLEGHENY NATIONAL FOREST												ALSO WARREN CO. UNDER KINZUA DAM
	POTTER														
P 3		S	DENTON HILL STATE PARK	500		88,674			4,100				13,500		PRIMARILY WINTER ACTIVITIES
P 5		S	LYMAN RUN STATE PARK	800	40	107,570		9,800	29,200	72,600		11,200	33,600	83,400	MOTOR BOATING NOT ALLOWED
P 8		S	OLE BULL STATE PARK	67	2	51,438		9,800	8,900	145,100		22,400	10,400	167,000	
P 6		S	SIZERVILLE STATE PARK	1,390		26,528		9,700	58,500	18,000		11,200	67,300	20,700	SWIM POOL
P 7		S	SUSQUEHANNOCK STATE FOREST	293,673		114,500		3,200	29,300			3,700	33,600		
	TIOGA														
T 1		S	COLTON POINT STATE PARK	540		144,221		9,800	41,000			11,200	47,200		PINE CREEK GORGE
T 4		S	HILLS CREEK STATE PARK	397	137	67,028		19,500	53,600	145,100		37,400	74,000	166,900	
T 2		S	LEONARD HARRISON STATE PARK	961		415,450		19,500	37,480			22,400	56,500		PINE CREEK GORGE
T 3		*	TIOGA-HAMMOND RESERVOIR								67,300	44,900	180,500	330,900	* ADMINISTRATING AGENCY UNKNOWN
T 5		S	TIOGA STATE FOREST	152,239		121,000			52,600				60,500		PRIMARILY A PICNIC AREA
	WARREN														
Wn 1		S	CHAPMAN DAM STATE PARK	803		348,715	4,700	13,000	104,200	218,400	5,400	33,600	134,500	251,200	
Wn 2		**	KINZUA DAM												** ACCUMULATION OF AGENCIES
			CORPS OF ENGINEERS		17,800						21,100	37,400	33,600		
			U.S. FOREST SERVICE	246,257								45,500	98,100	179,300	ALSO Mc KEAN CO. ALLEGHENY N.F.
			CONCESSION								77,500				
			PRIVATE SECTOR									29,900			
			TOTAL	846,709	43,678	25,289,495									

(F) FEDERAL
(S) STATE
(C) COUNTY
(L) LOCAL

(G.M.A.) GAME MANAGEMENT AREA
(B/L) BOAT LAUNCHING
(NO EST.) NO ESTIMATE
(N/A) NOT APPLICABLE

APPENDIX TABLE A4 - Phase II Supply, Private Campgrounds - Campsite Inventory and Estimated Capacity - Genesee River Basin Market Area.*

County - Name	1st Yr. Oper.	Sites '64	Sites '66	S/S - Summer Season Activity Days S/S '66	TS/S - Typical Summer Sunday Activity Days TS/S '66	Other Activities B-Boat P-Picnic S-Swim
Allegany						
Belle Hollow Campsite, Canaseraga	1964	20	40	7,800	200	
Camp Lake Rushford, Rushford	1958	40	80	15,600	400	
Camp Wagon Wheel, Cuba	--	--	15	3,000	75	
Cloud-9, Olean	--	--	--	--	--	P,S
Evergreen Camp, Angelica	--	No data				
Jean's Campsite, Rushford	--	No data				
Jones Pond Campsites, Angelica	1964	50	75	14,600	375	
Six-S, Angelica	--	--	--	--	--	P,S
Windy Hills Farm, Rushford	--	30	30	5,800	150	P,S
Cattaraugus						
Arrowhead Camping Area, Delevan	1962	250	270	52,600	1,350	B,P,S
Camp Skwim, Humphrey	Primarily a recreation day camp, sports oriented					S
Canadian Hill Recreation Machias	Proposed					
Cherry Valley Ranch, Cherry Valley	Primarily a church group camp					P,S
Lazee Acres, Otto	--	50	50	9,800	250	B,P,S
Lyndon Park, Franklinville	1964	150	300	58,500	1,500	S
Mobile Manor, Killbuck	--	5	5	975	25	
Cliff Peterson, Olean	--	10	300	58,500	1,500	B,P,S
Rainbow Lake Recreation Area, East Otto	1963	150	250	48,750	1,250	B,P,S
Riverhurst Park, Olean	Assumed to be out of business					
Moreland, Randolph	--	10	10	1,950	50	B,S
Timber Lake, East Otto	1964	150	200	39,000	1,000	B,S
Tomahawk, Great Valley	1965	--	10	1,950	50	
Wood Ridge Camp, Little Valley	1964	50	100	19,500	500	S
Welch's Grove, East Otto	--	--	10	1,950	50	P,S
Zoar Valley Campsite, Gowanda	--	150	150	29,250	750	

County - Name	1st Yr. Oper.	Sites '64	Sites '66	Activity Days S/S '66	Activity Days TS/S '66	Other Activities
Chautauqua						
Blue Water Beach, Westfield	1959	90	90	17,550	450	B,S
Leo Denault, Mayville	Assumed to be out of business					
Edgewater Tourist Camp, Westfield	1960	30	30	5,850	150	B,S
Gishler Camps, Chautauqua	--	5	5	975	25	
Hidden Valley Camping Area, Jamestown	1964	50	50	9,750	250	
Irvin's Beach, Ripley	1959	12	15	2,925	75	Golf
Lakeside Camp, Jamestown	--	50	50	9,750	250	B,S
Panama Rocks, Westfield	--	25	25	4,875	125	S
Smith's Sugar Camp, Cassadaga	1963	12	12	2,340	60	
Spring Creek Camp, Bemus Pt.	--	No data				
Ta-Wha-Net-Ko, S.Chautauqua	--	30	30	5,850	150	
Topsey's Boat Livery, Mayville		5	10	1,950	50	B,S
Vinnie Ville Trailer Park, Westfield	--	3	3	585	15	
Westfield Trailer Court, Westfield	--	No data				
Erie						
Bennington Park, Bennington	1963	40	50	9,750	250	
Camp Lake Wood, Angola	--	No data				
Cinderella Campsites, Grand Island	--	200	200	39,000	1,000	B,S
Copper Kettle, Akron	--	15	20	3,900	100	
John Fisher, East Aurora	--	No data				
Harlow Lake, Lancaster	--	225	225	43,875	1,125	
Highlander Forest, Chaffee	--	No data				
Lonesome Acres, Lancaster	Potential					
Navajo, Grand Island	--	30	30	5,850	150	B,S
Charles Phillips, Lancaster	--	25	25	4,875	125	
Schang-Ri-Lina, Wales Center	1960	50	100	19,500	500	
Simpson's Grove, Akron	--	10	10	1,950	50	P
Genesee						
Darien Lake, Corfu	1954	120	120	23,400	600	B,P,S
Deep Spring Camp, Darfield	Assumed to be out of business					

County - Name	1st Yr. Oper.	Sites '64	Sites '66	Activity Days S/S '66	Activity Days TS/S '66	Other Activities
Genesee (cont'd)						
Harlow Lake, Darien**	--	250	250	48,750	1,250	
Indian Falls Lake, Inc., Corfu	1956	430	430	83,850	2,150	B,P,S
Lonesome Acres, E.Pembroke	--	65	65	12,675	325	
Nu Lake, Inc., Batavia	--	10	10	1,950	50	B,P,S
Tumberlane Lake	--	70	70	13,650	350	P,S
Conesus Lake Campground, Conesus	--	No data				
Green Valley Trailer Camp, Mt. Morris	--	35	35	6,825	175	
Holiday Hill Campground, Springwater	1963	40	40	7,800	200	S
Lakeview Point Park, Livonia	--	20	20	3,900	100	
Maple View Camp, Caledonia	1964	5	5	975	25	
Sugar Creek Glen Cove Camping Area, Dansville	--	60	60	11,700	300	S
Wildcat Lake, Nunda	--	25	25	4,875	125	
Wood's Campsites, Nunda	1963	40	40	7,800	200	
Monroe						
Pine Ridge Campsites, Honeoye	1962	15	20	3,900	100	
Niagara						
Bedford Beach Campground, Lockport	1957	150	150	29,250	750	S
Daisy Barn Campsite, Wilson	1956	150	150	29,250	750	
Ancel Jowdy, Lockport	--	300	300	58,500	1,500	S
Hicks Camp, Wilson	--	10	10	1,950	50	
Mt. Leatzan, Sanborn	--	No data				
Lloyds Fishing Ranch, Pendleton	--	No data				
Lynch Park Campground, Niagara Falls	--	10	10	1,950	50	
Mirror Lake, Gasport	--	300	300	58,500	1,500	S
Niagara Airport Park, Niagara Falls	1964	200	200	39,000	1,000	

**Now state of New York property.

County - Name	1st Yr. Oper.	Sites '64	Sites '66	Activity Days S/S '66	Activity Days TS/S '66	Other Activities
Ontario						
Finger Lakes Campsite Recreation Assoc., Canandaigua	Potential					200 Campsites Swim Pool
Red Jacket Campground, Manchester	--	100	100	19,500	500	
Orleans						
Greene Harbor Marina, Kuckville	--	40	40	7,800	200	B,S
Wildwood Lake, Medina Lake	1964	100	100	19,500	500	
Steuben						
Austindale Campsite, Kanona	1964	14	30	5,850	150	
Bonnie Brae Camp, Prattsburg	1964	25	50	9,750	250	
Camper's Haven, Bath	1964	26	26	5,070	130	
Ferenbaugh Campsites, Corning	1964	20	20	3,900	100	
Hickory Hill Campsite, Bath	--	30	30	5,850	150	S
Peter Kiklowicz, Bradford	Potential					Likely NO Pond
Joseph Karwaski, Bath	Proposed					
Lakeview Campsite, Dundee	--	30	30	5,850	150	
Wayne						
Fred Cornwall, Pultneyville	1965	--	20	3,900	100	B,S(fish)
Idlewood-on-the-Lake, Sodus Point	1959	30	30	5,850	150	B,S
Orchard Beach Campsites, Sodus Point	1959	43	44	8,580	220	S
Sunnybrook Farm, Palmyra	--	No data				
Wyoming						
Hugh Eddy, Castile	--	--	10	1,950	50	
Dream Lake, Warsaw	--	3	5	975	25	P,S
Pine Tree Acres, Warsaw	--	--	5	975	25	P,S
Hemlock Glens, Varysburg	--	10	20	3,900	100	P
Ken Lee Haven, Java Center	1964	66	66	12,870	330	S
MiLay Recreation Resort, Inc., Pike	1964	200	500	97,500	2,500	S
Mockingbird Park, Arcade	--	--	10	1,950	50	P
Perry's Wiscoy Haven, Bliss	1964	25	50	9,750	250	S

County - Name	1st Yr. Oper.	Sites '64	Sites '66	Activity Days S/S '66	Activity Days TS/S '66	Activities
Yates						
Indian Village Campsites, Rushville	1962	120	170	33,150	850	B,S
Rock Stream Campsites, Rock Stream	1964	10	20	3,900	100	
Starkey Point, Dundee	--	200	200	39,000	1,000	
Thumb Lake Campground, Penn Yan	1962	100	125	24,375	625	B
Wigwam Harbor, Bluff Point	1962	30	30	5,850	150	B,S
Potter County, Pa.						
Deer Lick Camps, Coudersport	--	50	50	9,750	250	
Sugarbush Campground, Galeton	--	25	25	4,875	125	S

*From Directory of Private Family Campgrounds in New York State, Cornell University, Ithaca, New York (1965).

APPENDIX TABLE A5 - Phase II Supply, Golf Courses - Existing and Proposed, Genesee River Basin Market Area.

Note: The following list of golf courses represents all three inventory phases, but is included herein under Phase II. The level of administration is not contained in the list, nor is there a claim to a complete inventory.

County	Course Name or Area	Holes Existing	Holes Proposed	Other Activities & Remarks
Allegany	Bolivar Country Club	9	-	
	Wellsville Country Club	9	-	
	Six-S	-	18	
Cattaraugus	Allegheny Hills	9	9	
	Bartlett Country Club	18	-	
	Birch Run Country Club	9	-	
	Conewango Forks	9	9	
	Elkdale Country Club	9	-	Swimming
	St. Bonaventure	9	-	
	City of Olean	-	(9)*	
McKean, Pa.	Bradford Area Golf Assoc.	-	36	Swimming; sports area
	Penn Hills Country Club	18	-	
	Kane Country Club	9	-	
	Smithport Country Club	9	9	
Potter, Pa.	Coudersport Country Club	9	-	
Chautauqua	Irvin's Beach	-	(9)*	
	Jamestown Municipal	9	-	Needs relocation
	Bergman Park, Jamestown	-	-	Potential indicated
	Long Pt. on Lake Chautauqua State Park	-	-	Potential indicated
Erie	Town of Hamburg	-	9	
	Town of Evans	-	(9)*	
	Town of Amherst	27	18	
	Buffalo	54	-	
	Erie County	18	(9)*	
	Beaver Island State Park	18	-	
	Evangola State Park	-	-	Potential indicated
	Town of Tonawanda	36	-	
Niagara	Niagara County Golf Course	18	18	
	Niagara Falls (Hyde Park)	36	-	
	North Tonawanda	-	18	
	Lower Niagara State Park	-	-	Potential indicated

County	Course Name or Area	Holes Existing	Holes Proposed	Other Activities & Remarks
Ontario	Ontario County	-	(9)*	
	Village of Victor	-	(9)*	Recommended
	Harriet Spencer Memorial Recreation Area	-	(9)*	
Monroe	Genesee Valley County Park (East)	36	-	
	Braddock Bay State Park	-	-	Potential indicated
	Churchville County Park	27	-	
	Durand-Eastman County Park	18	-	
	Mendon Ponds County Park	-	(9)*	
Wayne	Chimney Bluffs State Park	-	-	Potential indicated
Wyoming	Silver Lake State Park	-	-	18 Hole-Potential indicated

*Assumed

APPENDIX TABLE A6 - Phase II Supply, Natural History Areas, Nature Centers, Organizations, Existing and Proposed, Genesee River Basin Recreation Market Area.

County	Name, Location or Area	Remarks
Allegany	Moss Lake Sanctuary, Kettle Lake, 81 acres	Nature Conservancy, Inc., bog heath; hemlock-hardwood forest
	Lake Foster, Alfred	Private sanctuary and recreation area
	Alma Pond, Alma	Private-potential wildlife area
	Birdsall Swamp, Birdsall (Black Creek)	Private-potential wildlife area
Cattaraugus	Deer Lick Sanctuary, Cattaraugus Creek, 400 acres	Nature Conservancy, Inc., mixed hardwoods
Chautauqua	Lake Erie Bird Club (Dunkirk-Fredonia)	Federation of N.Y.State Bird Clubs
	Town of Carroll, 20 acres	Nature center planned
	Town of Pomfret	Nature center planned
Erie	Buffalo Audubon Society	Federation of N.Y.State Bird Clubs
	Buffalo Ornithological Society	" " " " "
	City of Lackawanna, 15 acres	Nature center planned
Genesee	Bergen Swamp, 2000 acres near Bergen	Probably local conservancy group
Monroe	Burroughs Audubon Nature Club, Rochester	Federation of N.Y.State Bird Clubs
	Genesee Ornithological Society, Rochester	" " " " "
Ontario	Bentley Tract, 22 acres	Nature Conservancy, Inc., beech-hemlock; source of Irondequoit Creek
	Ontario County Park System	Wildlife area planned
	Dutcher Sanctuary	National Audubon Society Sanctuary

County	Name, Location or Area	Remarks
Wayne	Wayne County Area	Federation of N.Y.State Bird Clubs
	Southeastern Wayne County, Savannah	Private-Great Blue Heron Rookery

APPENDIX TABLE A7 - Phase II Supply, Public and Private Ski and Winter Sports Areas - Existing and Proposed, Genesee River Basin Market Area.

County (N.Y.)	Name of Area, Location	Remarks
Allegany	Swain Ski Slopes, Nunda	
Cattaraugus	Big Basin, Allegany State Park	
	Blue Mountain, Yorkshire	
	Bova, Allegany State Park	
	Grosstal, Allegany	
	Holiday Valley, Ellicottville	
Chautauqua	Peek 'N Peak, French Creek, Jamestown (City)	Programmed ski facilities
Erie	Chestnut Ridge County Park	
	Emery County Park	
	Glenwood, Glenwood	Snow making machine
	Kissing Bridge, Glenwood	
	Town of Hamburg	Proposed ski area
Genesee	Frost Ridge, LeRoy	
Monroe	Powder Mill County Park	
Niagara	Niagara County Park System	Programmed (Escarpment Park)
Ontario	Bristol Mountain, Bristol Center	Snow making machine
Wayne	Brantling, Newark	Snow making machine
Wyoming	Village of Wyoming	Area recommended
Yates	Ski Valley, Naples	
McKean, (Pa.)	Zippo Ski Slopes, Bradford	
Potter, (Pa.)	Denton Hill, Galeton	
Warren, (Pa.)	Youngsville Skiway, Youngsville	

APPENDIX TABLE A8 - Phase III Inventory, Lesser Political Subdivisions, Planned Programs and Acquisitions - 1980. (Contains some added program information from Phase I, Metropolitan Areas)

Activity Days
S/S - Summer Season
T/S/S - Typical Summer Sunday

Political Subdivision	Boat		Camp		Picnic		Swim		Other Activities	Programs - Remarks
	S/S	T/S/S	S/S	T/S/S	S/S	T/S/S	S/S	T/S/S		
Allegany County Administration										Almond Reservoir common with Steuben County.
Wellsville Village					17,400	450	54,000	1,500	Foot trail-2 miles	83 acres - recreation land
Cattaraugus County Administration	9,750	300	32,500	500	8,700	225	40,000	750	Foot trail-1 mile	Plan 100 acres lease on Kinzua Dam. Own 2 lakes (70 acres) and 16 county forest sites - 2000 acres.
Village of Cattaraugus					Planned		3-pool complex			Quasi public organization.
City of Olean	8,700	200			58,000	1,500	172,800	4,800	Foot trail-3 miles	2 swim pools; golf planned; plan Ribbon Park along Allegany River
Town of Machias					14,500	375	27,000	750		Have access to farm ponds.
Chautauqua County										Problems with pollution; vacation homes
Jamestown	5,800	100			58,000	1,500	32,000	600	Golf - Ski lift	Need swim pool
Dunkirk	17,400	400			232,000	6,000	360,000	6,750		Have Wright & Pt. Gratiot Parks.
Town of Carroll					2,000	50	2,700	75	Trail - 2 miles. Nature Ctr.	Pollution problem-Conewango Lake. Have 315 acre park & one 200 acre park.

APPENDIX TABLE A8 - Continued

Political Subdivision	Boat S/S	Boat T/S/S	Camp S/S	Camp T/S/S	Picnic S/S	Picnic T/S/S	Swim S/S	Swim T/S/S	Other Activities	Programs - Remarks
Town of Pomfret					5,800	150			Trail - 2 miles; Nature Ctr.	Plan 200 acre park.
Town of Portland					11,600	300	2,700	75		6 acres park; plan added 8 acres.
Town of Fredonia					2,600	70				5 acres; have 44 acres on lake.
Long Pt. on Lake Chautauqua S.P.					67,300	1,700				Added to Phase I; BOR Grant in-Aid
Erie County Administration	19,600	500							Golf planned, 18-mile-creek	Add 4655 acres in 7 new parks, 5 existing parks. 10 forest acres. 3000 acres total.
City of Buffalo	11,600	200					230,000	4,800	4 golf courses	Add Shoshone swim pool complex. Ontario St. Boat launching site. Develop Times Beach. Pollution a problem.
City of Lackawanna	17,400	400			29,000	750	32,400	900	Plan nature center	Smokes Creek Park.
Town of Hamburg	34,800	700			79,800	2,100	960,000	25,800	Golf (9 holes). Ski planned. 15 mi. trail.	Own 13 miles stream easements.
City of Tonawanda	87,000	2,000			36,200	900	27,000	800		Plan two 20-acre areas; parkways
Town of Grand Island	5,800	100								Have 2 parks(40 acres) undeveloped. Access to Niagara River limited.

APPENDIX TABLE A8 - Continued

Political Subdivision	Boat S/S	Boat T/S/S	Camp S/S	Camp T/S/S	Picnic S/S	Picnic T/S/S	Swim S/S	Swim T/S/S	Other Activities	Programs - Remarks
Town of Evans	11,600	200			29,000	800	40,000	800	Plan trails and golf.	Have 9 small parks; one 12 acre park.
Town of Clarence	5,800	100								Parks(70 acres), residents only.
Town of Amherst	9,800	300			27,800	700	108,000	3,000	4 golf courses	Have Oak wood & Pfahl Pk plan 2 park developments
Town of Lancaster									Winter sports	Received BOR Grant-in-Aid
Town of Tonawanda (Village of Kenmore)	x	x			x	x	x	x	2 18-hole golf courses 4 swim pools 1 boat launch ramp on Niagara River	Information received subsequent to evaluated inventory of Phase III supply.
Genesee County										
Batavia					11,600	300	21,600	600		Acquire 125 acres at 8 sites. U.S. may convey V.A. lands (46 acres).
Livingston County										
Village of Avon					14,500	400	27,000	800	Horse trail-1 mile	Have 1 community park.
Town of Springwater					14,500	400				Has 8 acre athletic field.
Monroe County Administration										Total of 8,104 acres planned. Expand 5 county parks, 3 city parks (Juris.), create 3 parks; Irondequoit Bay, Salmon Creek, & Oatka Creek.

APPENDIX TABLE A8 - Continued

Political Subdivision	Boat S/S	Boat T/S/S	Camp S/S	Camp T/S/S	Picnic S/S	Picnic T/S/S	Swim S/S	Swim T/S/S	Other Activities	Programs - Remarks
Rochester	74,200	1,950	16,300	300	319,000	8,300	21,600	600	Plan hiking trails and walkways	Have vigorous natural beauty program (1966). Plans to improve: Genesee Marina, Seneca Park, Maple-Wood Park, Genesee Valley Park West, Troup-Clarissa Marina.
Town of Greese					63,800	1,700				Will develop Sauger Park & road sites; 4 undev. areas - 105 acres.
Town of Brighton										Have 7 acres partly developed. Plan Town Hall Park development.
Town of Henrietta					14,500	400				Have 90 acres partly developed. Will develop Henrietta Park.
Town of Irondequoit					900	-				Have 9 acres - will add 60 acres.
Town of Perinton					14,500	400	27,000	750		Have 18 acres + 55 acre Spring Lake. Will develop Egypt Park.
Town of Webster					Planned				Hiking & sports.	Received BOR Grant-in-Aid for 84.5 acre Schlegal Park.
Niagara County Administration	58,000	1,200	325,000	5,000	435,000	11,250	1,070,000	22,500	Plan ski, golf(18hole) trail - 6 miles	Have 5 parks; own 1500 acres open land. Will develop Barge Canal & Niagara Co. escarpment park.

APPENDIX TABLE A8 - Continued

Political Subdivision	Boat S/S	Boat T/S/S	Camp S/S	Camp T/S/S	Picnic S/S	Picnic T/S/S	Swim S/S	Swim T/S/S	Other Activities	Programs - Remarks
Niagara Falls	67,900	1,500			232,000	6,000	81,000	2,300	Playgrounds-play fields needed.	Propose Greenbelts & Robert Moses Parkway. Pine Acres housing project - plan swim pool at fed. surplus property.
North Tonowanda	18,800	400			14,500	400	54,000	1,500	Golf (18 holes)	Lack access to Niagara River.
Ontario County									Many private hunting grounds	New 400 acre park under construction. Honoye Lake encompassed.
Geneva	5,800	100			14,500	400	27,000	800		Plan park on Seneca Lake.
Town of Canandaigua	5,800	100								Should develop access to Can. Lake.
Town of Richmond										Should acquire Lake Beach area.
Village of Victor					14,500	400	27,000	800	Golf needed	Have 8 acre undeveloped park.
Orleans County										Access to Lake Ontario - Lake Ontario Parkway planned Barge Canal passage.
Steuben County										Almond Reservoir common with Allegany County. Have 100 acres in 4 forests.
Town of Bath										Have indicated urgent needs.
Village of Woodhull							27,000	800		

APPENDIX TABLE A8 - Continued

Political Subdivisions	Boat S/S	Boat T/S/S	Camp S/S	Camp T/S/S	Picnic S/S	Picnic T/S/S	Swim S/S	Swim T/S/S	Other Activities	Programs - Remarks
Wayne County										Have Foreman County Park. County contains many marshes, barge canal Lake Ontario access.
Town of Easton										One 100-acre site.
Town of Ontario										2 areas - 60 acres total.
Wyoming County										Source of many streams.
Village of Wyoming					14,500	400	27,000	800	Ski area needed.	
Yates County										Resort area - Seneca, Canandaigua, Keuka Lakes.
Village of Penn Yan	5,800	100			17,400	4,500	27,000	800		Have 2 parks - 6 acres; will acquire 80 acres. 2 watershed areas owned.
McKean County (Pa.)										
Village of Kane										Have Evergreen & Glenwood Parks.

APPENDIX TABLE A9 - Attributes and Attractions of the Genesee Recreation Market Area. Areas or Sites of Regional or Greater Interest.*

County	Adm.	Site	Significance
Allegany	P	Reiss Game Farm, Cuba	Game farm; natural history; hunting; fishing; cabins; airstrip
Cattaraugus	P	Allegany Indian Reservation	Indian culture
"	P	AVSCA (Allegany Valley Sports Car Assoc.), Allegany	Active sports car club; features organized auto rally events
"	P	Breathing Well, Great Valley	Unique geology; cave
"	P	Cattaraugus Indian Reservation	Indian culture
"	Prop.	"Iroquoia", Salamanca	Seneca and Iroquois confederacy indian arts and culture
"	P	Little Rock City, Salamanca	Unusual geology; picnicking
"	P	Panama Rocks, Panama	Unusual geology; picnicking; camping
"	P	Riverhurst Park, Olean	Prehistoric animal replicas; picnicking;
"	P	Rock City Park, Olean	Unusual geology; picnicking
"	S-P	Zoar Valley, Gowanda	Scenic Cattaraugus Creek gorge area
Chautauqua	QP	Chautauqua Festival, Jamestown	Nationally known 19th-20th Century cultural center; cf. also Chautauqua lecture circuit; drama; opera; symphony; world famous soloists
"	P	James Prendergast Library, Jamestown	Art gallery; 1870-90 local collections
"	P	NY-Penn Baseball, Jamestown	Professional baseball
Erie	P	Boat Trips, Buffalo	Sightseeing-Buffalo Harbor; Niagara River; Black Rock Lock and Canal
"	P	"Buffalo Bills", Buffalo	American Football League; professional football
"	P	"Buffalo Bisons", Buffalo	International Baseball League; professional baseball
"	P	"Buffalo Bisons", Buffalo	Professional ice hockey
"	L	Buffalo Museum of Science, Buffalo	Natural history and science exhibits including Kellogg Observatory (astronomy)
"	L	Delaware Park Zoo, Buffalo	Animal displays in natural habitat

County	Adm.	Site	Significance
Erie	P	Fantasy Island, Buffalo	Children's fantasy park
"	P	Our Lady of Victory National Shrine, Lackawanna	Religious shrine; architecture (RC)
"	P	Seismological Station, Buffalo	Earthquake recording apparatus (Canisius College)
Genesee	S	John White Game Farm, Oakfield	Wildlife rearing area
"	S	Oak Orchard Dog Field Trial Area, Alabama	Retriever dog field trial area; national points available
"	P	Tonawanda Indian Reservation	Indian culture
Livingston	P	International Rock Salt Mine, Retsof	Largest rock salt mine in western world (International Salt Company)
"	P	Livonia, Avon & Lakeville Railroad	Steam touring line, 23 miles
"	F	Mt. Morris Dam, Mt. Morris	Federal flood control structure
Monroe	P	Bausch & Lomb, Inc., Rochester	Descriptive tours; precision instruments; optical products
"	P	Eastman-Kodak, Rochester (see also: Geo. Eastman House)	Descriptive tours; photographic and optical works
"	P	Finger Lakes Trail Conference Rochester	Planning, development and promotion of a 350-mile trail from the Catskills to the Allegheny Mountains; through the Southern Tier; 300 miles of branch trails also planned. Will connect w/AT, Long Trail (VT.), Bruce Trail (Canada)
"	L	Lilac Time Festival, Rochester	Colorful local festival
"	P	Lollypop Farm, Rochester	Children's zoo
McKean, Pa.	S	Kinzua Bridge State Park, Mt. Jewett	New state park; contains Kinzua Bridge, second highest railroad viaduct in the world (built 1882 by Erie Railroad)
"	-	Fossil Collecting Site within city of Bradford	Shale and sandstone outcroppings exhibiting marine fossils (brachiopods) of the Devonian Period

County	Adm.	Site	Significance
McKean, Pa.	P	Lobo Wolf Park, Kane	Preservation of vanishing wildlife species
Niagara	S	Barge Canal Locks, Lockport	Canal locks on commercial and recreational waterway
"	S-L-P	Horseshoe and American Falls, Niagara Falls	World famous cataracts and tourist area; Power Vista (state hydroelectric site); excursions
"	L	Niagara Aquarium, Niagara Falls	Marine live fish displays
"	Proposed	Niagara Garden Center, Niagara Falls	Representative foreign garden displays
"	L	Oppenheim Zoo, Niagara Falls	Animal displays
"	P	Our Lady of Fatima Shrine, Youngstown	Religious shrine (RC)
"	Proposed	Prospect Point Observation Tower, Niagara Falls	Scenic lookout
"	P	Tuscarora Indian Reservation	Indian culture
"	P	Wonderland Storybook Park, Wilson	Children's nursery rhyme village
Ontario	L	Grimes Glen, Naples	Scenic area; picnicking; grape growing annual grape festival
"	P	NY-Penn Baseball, Geneva	Professional baseball
"	P	Sonnenberg Gardens, Canandaiqua	Formal gardens
Potter, Pa.	P	Croyle Wildlife Area, Olean	Unusual wildlife feeding area
"	P	Potter County Angler's Club, Galeton	Fish hatchery
"	P	The Ice Mine, Coudersport	Unique geology; cave
"	-	Fossil Collecting Site, 1 Mile Southeast of East Sharon on Plank Creek	Shale and sandstone outcroppings exhibiting marine fossils (brachiopods, bryozoans, fish scales) of the Devonian Period
Steuben	F	Almond Dam, Hornell	Federal flood control structure
"	P	Corning Glass Center, Corning	Glassmaking; hand crafted Steuben crystal - exhibits and manufacture; museum.

County	Adm.	Site	Significance
Warren, Pa.	F	Kinzua Dam, Warren	Federal flood control structure
"		Pine Creek Gorge, Wellsboro	"Grand Canyon" of Pennsylvania
Wayne	L	Apple Blossom Festival, Williamson	Colorful local festival
"	S	Chimney Bluff, Wolcott	Highly unusual geologic formation (undeveloped state park)
"	P	Rose Gardens, Newark	"Rose Capital of America"; annual rose festival
Wyoming	P	American Blue Stone Tour, Portageville	Stone quarry tours; blue stone product manufacturing
"	P	Arcade & Attica Railroad	Steam touring line - 30 miles

*References: ALLE-GEE-WEES, Spring-Summer Issue, Olean Times Herald, 1965; New York State Vacationlands, State of New York, Department of Commerce, Albany, 1966; Fossil Collecting in Pennsylvania, Donald M. Hoskins, General Geology Report G40, Commonwealth of Pennsylvania, Bureau of Topographic and Geologic Survey, Harrisburg, 1964.

APPENDIX TABLE A10 - Attributes and Attractions of the Genesee Recreation Market Areas. Area or Sites of Historic Interest.**

County	Adm.*	Site	Significance
Allegany	L	GAR Hall, Friendship	Possible origin of republican party
"	P	Phillip Church (Belvidere) Mansion, Belvidere	Post-Colonial architecture reputedly from sketches by Benjamin Henry Latrobe
"	P	Oil Museum, Boliver	Area history - oil industry
"	L	Rigdon Burial Place, Friendship	Religious history (LDS)
"	S	Seneca Oil Spring, Cuba	Source of first petroleum in America (1627)
"	-	The Americana Home, Belmont	Former Whitney Mansion
"	P	The Pink House, Wellsville	The Hall Home, focal point of an area romantic tragedy described in poetry
Cattaraugus	P	Cattaraugus County Historic Museum, Little Valley	Area history
"	-	Conewango Valley Areas	Prehistoric Indian culture; burial mounds
"	P	Limestone, Limestone	First oil well in New York (1865)
"	P	McNamara Indian Museum, Salamanca	Indian history and artifacts
"	P	Nancy's Well, Ellicottville	Fieldstone Waterloo battle monument
"	L	Portville Free Library, Portville	Colonial architecture
"	P	Red House, Allegany State Park	Boarded Allegany River raftsmen
"	P	St. Bonaventure University, Olean	Area and religious history (RC)
"	P	St. John's Epicopal Church, Ellicottville	Historic church with spanish bell (EP)
Chautauqua	L	Holland Land Company Vault, Mayville	Pioneer settlement history (1806)
"	QP	Chautauqua Institution, Jamestown	Internationally famous and influential 19th century cultural institution
Erie	P	Albright-Knox Art Gallery	Contemporary-historical art and sculpture
"	P	Ansley Wilcox House, Buffalo	Theodore Roosevelt took oath of office, Sept. 14, 1901, following assassination of President McKinley. Important example of post-colonial architecture
"	P	Buffalo & Erie County Historical Society	Local history

County	Adm.	Site	Significance
Genesee	L	Holland Land Office, Batavia	Pioneer settlement museum (1814) (National Historic Landmark)
"	L	LeRoy House, LeRoy	Triangle Tract land museum (1815)
"	P	Maretta's Doll and Toy Museum, Bergen	Historic toy collection
Livingston	S	Boyd-Parker Memorial, Cuylerville	Revolutionary war memorial (1779)
"	S	Caledonia Fish Hatchery, Caledonia	Commemorates Seth Green, pioneer fish culturist and conservationist (1864)
"	P	Genesee Valley Canal, Nunda	Remants of historic canal and locks on 100-mile waterway between Rochester and Olean
"	S	Sullivan Monument, Groveland	Revoluntionary war memorial (1779)
Monroe	P	Campbell-Whittlesey House, Rochester	Restored greek revival mansion
"	P	George Eastman House, Rochester	Museum of photography
"	L	Museum of Arts and Sciences, Rochester	Area history and culture
"	P	Susan B. Anthony House, Rochester	Women's suffrage history
Niagara	P	Museum of Antique Art Glass, Lockport	Antique art and cut glass
"	P	Niagarama Animated Historical Museum, Niagara Falls	Local history dioramas
"	L	Niagara Wax Museum	Local history
Ontario	P	Ghost City of Valentown Museum, Fishers	Restored 1879 village
"	P	Granger Homestead, Canandaigua	Local history
"	L	Hill Cumorah, Palmyra	Religious history (LDS)
"	L	Ontario County Museum, Canandaigua	Area pioneer history
"	P	Steam Traction Engine Display, E.Bloomfield	Steam power history

County	Adm.	Site	Significance
Steuben	P	Corning Glass Museum, Corning	Internationally famous exhibits; incomparable collection of American blown glass
"	P	Glenn Curtiss Museum, Hammondsport	Aviation-wine making history
Wyoming	-	Bluestone Fort, Portageville	Prehistoric Iroquois fortified village
"	P	Genesee Falls Hotel, Portageville	Local history
"	S	Glen Iris, Letchworth State Park	Former home of park donor William Pryor Letchworth
"	S	Indian Museum, Letchworth State Park	Area history
"	S	Mary Jemison Statue, 2nd Burial Place, Letchworth State Park	Pre-revolutionary war history
"	P	Middlebury Academy, Wyoming	First classical academy in state
"	S	Seneca Council House, Letchworth State Park	Area history
Yates	P	Garrett Memorial Chapel	Architectural history
"	P	Wagener Mansion, Bluff Pt. (Keuka L.)	Local history; scenic view
Potter	P	Potter County Historical Society, Coudersport	County history

The area below is recommended for inclusion in the National Survey of Historic Sites and Buildings, and as a possible national registered historic landmark.

County	Adm.	Site	Significance
Livingston	P	The Wadsworth Estates, Geneseo	Internationally known family; pioneer settlers (1790) known to have developed the Genesee Valley; renowned statesmen; MFH, Genesee Valley Hunt (several generations)

*Administration. L-Local; P-Private; QP-Quasi-public
S-State; - Unknown

**References: Rivers of America, THE GENESEE, Henry W. Clune, 1963, Holt, Rinehart and Winston, 338 pp; ALLE-GEE-WEES, Spring-Summer Issue, Olean Times Herald, 1965.

APPENDIX TABLE A11 - Recapitulation of Summer Season, Typical Summer Sunday, Demand, Supply and Needs for Key Outdoor Recreation Activities 1960 - 2020, Genesee River Basin Recreation Market Area.

I,II,III - supply inventory phases
R - revised T - total

BOATING	Summer Season			Typical Summer Sunday		
	Demand	Supply	Needs + -	Demand	Supply	Needs + -
			1960			
Metropolitan Areas	2,533.7	145.5	2,388.2	77.7	3.8	73.9
Barge Canal	136.7	0.7	136.0	4.2		4.2
Central Plains	293.9	54.1	239.8	9.0	1.4	7.6
Allegany Plateau	696.8	51.1	645.7	21.1	1.3	19.8
Total	3,661.1	251.4	3,409.7	112.0	6.5	105.5
			1980			
		I 516.9			I 11.5	
		II 35.6			II 0.8	
		III 439.6			III 9.8	
Metropolitan Areas	5,393.6	T 992.1	4,401.5	158.2	T 22.1	136.1
		I 262.8			I 5.9	
		II 29.1			II 0.6	
		III			III	
Barge Canal	264.8	T 291.9	27.1	7.8	T 6.5	1.3
		I 152.7			I 3.4	
		II			II	
		III 17.4			III 0.4	
Central Plains	562.9	T 170.1	402.8	16.6	T 3.8	12.8
		I 294.6			I 6.6	
		II 14.5			II 0.3	
		III 41.6			III 0.9	
Allegany Plateau	1,249.0	T 350.7	898.3	36.6	T 7.8	28.8
Total	7,470.3	1,794.8	5,675.5	219.2	40.2	179.0
			2000			
		I 646.1			I 11.5	
		II 44.5			II 0.8	
		III 549.5			III 9.8	
Metropolitan Areas	9,061.3	T 1,240.1	7,821.2	265.7	T 22.1	243.6
		I 328.5			I 5.9	
		II 36.4			II 0.6	
		III			III	
Barge Canal	462.0	T 364.9	97.1	13.5	T 6.5	7.0
		I 190.9			I 3.4	
		II			II	
		III 21.8			III 0.4	
Central Plains	837.3	T 212.7	624.6	24.5	T 3.8	20.7
		I 368.2			I 6.6	
		II 18.1			II 0.3	
		III 52.0			III 0.9	
Allegany Plateau	1,987.9	T 438.3	1,549.6	58.4	T 7.8	50.6
Total	12,348.5	2,256.0	10,092.5	362.1	40.2	321.9
			2020			
Metropolitan Areas	12,614.9	1,550.1	11,064.8	364.3	22.1	342.2
Barge Canal	626.0	456.1	169.9	18.0	6.5	11.5
Central Plains	1,249.8	265.9	983.9	36.1	3.8	32.3
Allegany Plateau	2,512.6	547.9	1,964.7	72.7	7.8	64.9
Total	17,003.3	2,820.0	14,183.3	491.1	40.2	450.9

APPENDIX TABLE A11 - Continued

CAMPING	Summer Season Demand	Summer Season Supply	Summer Season Needs +	Summer Season Needs -	Typical Summer Sunday Demand	Typical Summer Sunday Supply	Typical Summer Sunday Needs +	Typical Summer Sunday Needs -
1960								
Metropolitan Areas	486.4	60.1		426.3	12.6	0.9		11.7
Barge Canal	26.0			26.0	0.6			0.6
Central Plains	56.2	48.8		7.4	1.4	0.8		0.6
Allegany Plateau	133.7	252.9	119.2		3.4	4.0	0.6	
Total	702.3	361.8		340.5	18.0	5.7		12.3
1980								
		I 328.9				I 4.4		
		II 403.6				II 9.0		
		IIR 40.4				IIR 0.9		
		III 341.3				III 4.6		
Metropolitan Areas	2,094.0	T 710.6		1,383.4	33.0	T 9.9		23.1
		I 186.8				I 2.5		
		II 52.5				II 1.2		
		IIR 5.2				IIR 0.1		
		III				III		
Barge Canal	102.8	T 192.0	89.2		1.6	T 2.6	1.0	
		I 548.4				I 7.3		
		II 556.4				II 12.4		
		IIR 55.6				IIR 1.2		
		III				III		
Central Plains	218.8	T 604.0	385.2		3.5	T 8.5	5.0	
		I 801.7				I 10.7		
		II 555.2				II 12.4		
		IIR 55.5				IIR 1.2		
		III 32.5				III 0.4		
Allegany Plateau	484.0	T 889.7	405.7		7.8	T 12.3	4.5	
Total	2,899.6	2,396.3		503.3	45.9	33.3		12.6
2000								
		I 411.1				I 4.4		
		II 504.5				II 9.0		
		IIR 50.5				IIR 0.9		
		III 426.6				III 4.6		
Metropolitan Areas	4,610.8	T 888.2		3,722.6	97.6	T 9.9		87.7
		I 233.5				I 2.5		
		II 65.6				II 1.2		
		IIR 6.5				IIR 0.1		
		III				III		
Barge Canal	235.2	T 240.0	4.8		5.0	T 2.6		2.4
		I 685.5				I 7.3		
		II 695.5				II 12.4		
		IIR 69.5				IIR 1.2		
		III				III		
Central Plains	426.0	T 755.0	329.0		9.0	T 8.5		0.5
		I 1,002.1				I 10.7		
		II 694.0				II 12.4		
		IIR 69.4				IIR 1.2		
		III 40.6				III 0.4		
Allegany Plateau	1,011.6	T 1,112.1	100.5		21.4	T 12.3		9.1
Total	6,283.6	2,995.3		3,288.3	133.0	33.3		99.7
2020								
Metropolitan Areas	7,793.6	1,110.2		6,683.4	164.9	9.9		155.0
Barge Canal	386.8	300.0		86.8	8.2	2.6		5.6
Central Plains	772.0	968.8	196.8		16.6	8.5		8.1
Allegany Plateau	1,552.4	1,390.1		162.3	32.9	12.3		20.6
Total	10,504.8	3,769.1		6,760.7	222.6	33.3		189.3

APPENDIX TABLE A11 - Continued

PICNICKING

	Summer Season				Typical Summer Sunday			
	Demand	Supply	Needs +	Needs -	Demand	Supply	Needs +	Needs -
1960								
Metropolitan Areas	5,377.0	3,809.3		1,567.7	165.4	97.6		67.8
Barge Canal	290.1			290.1	8.9			8.9
Central Plains	623.4	459.9		163.5	19.0	12.4		6.6
Allegany Plateau	1,478.0	761.7		716.3	45.4	19.5		25.9
Total	7,768.5	5,030.9		2,737.6	238.7	129.5		109.2
1980								
		I 5,401.8				I 120.6		
		II 38.3				II 0.8		
		III 1,419.0				III 31.7		
		T 6,859.1				T 153.1		
Metropolitan Areas	9,648.3	RT 8,573.9		1,074.4	296.8	RT 191.4		105.4
		I 478.1				I 10.7		
		II 2.9				II 0.1		
		III				III		
		T 481.0				T 10.8		
Barge Canal	473.8	RT 601.3	127.5		14.6	RT 13.5		1.1
		I 1,578.4				I 35.2		
		II 14.5				II 0.3		
		III 101.5				III 2.3		
		T 1,694.4				T 37.8		
Central Plains	1,007.3	RT 2,118.0	1,110.7		31.0	RT 47.2	16.2	
		I 1,543.4				I 34.4		
		II 72.5				II 1.6		
		III 477.9				III 10.7		
		T 2,093.8				T 46.7		
Allegany Plateau	2,234.4	RT 2,617.3	382.9		68.6	RT 58.4		10.2
Total	13,363.8	13,910.5	546.7		411.0	310.5		100.5
2000								
		I 6,752.2				I 120.6		
		II 47.9				II 0.8		
		III 1,773.8				III 31.7		
		T 8,573.9				T 153.1		
Metropolitan Areas	14,159.4	RT10,717.4		3,442.0	435.4	RT 191.4		244.0
		I 597.6				I 10.7		
		II 3.6				II 0.1		
		III				III		
		T 601.2				T 10.8		
Barge Canal	721.9	RT 751.5	29.6		22.2	RT 13.5		8.7
		I 1,973.0				I 35.2		
		II 18.1				II 0.3		
		III 126.9				III 2.3		
		T 2,118.0				T 37.8		
Central Plains	1,308.2	RT 2,647.5	1,339.3		40.2	RT 47.2	7.2	
		I 1,929.2				I 34.4		
		II 90.6				II 1.6		
		III 597.4				III 10.7		
		T 2,617.2				T 46.7		
Allegany Plateau	3,106.4	RT 3,271.5	165.1		95.5	RT 58.4		37.1
Total	19,295.9	17,387.9		1,908.0	593.3	310.5		282.6
2020								
Metropolitan Areas	18,940.0	13,396.8		5,543.2	582.8	191.4		391.4
Barge Canal	940.1	939.4		.7	28.9	13.5		15.4
Central Plains	1,876.7	3,309.4	1,432.7		57.8	47.2		10.6
Allegany Plateau	772.2	4,089.4	317.2		116.1	58.4		57.7
Total	25,529.0	21,734.9		3,794.0	785.6	310.5		475.1

APPENDIX TABLE A11 - Continued

SWIMMING	Summer Season Demand	Summer Season Supply	Summer Season Needs +	Summer Season Needs -	Typical Summer Sunday Demand	Typical Summer Sunday Supply	Typical Summer Sunday Needs +	Typical Summer Sunday Needs -
			1960					
Metropolitan Areas	11,908.4	5,055.4		6,853.0	371.6	97.2		274.4
Barge Canal	642.1			642.1	20.0			20.0
Central Plains	1,380.5	130.0		1,250.5	42.9	2.5		40.4
Allegany Plateau	3,273.2	1,943.8		1,329.4	101.9	37.3		64.6
Total	17,204.2	7,129.2		10,075.0	536.4	137.0		399.4
			1980					
		I 8,441.7				I 203.9		
		II				II		
		III 2,651.0				III 64.0		
		T 11,092.7				T 267.9		
Metropolitan Areas	23,379.7	RT 13,865.9		9,513.8	705.6	RT 334.9		370.7
		I 869.3				I 21.0		
		II				II		
		III				III		
		T 869.3				T 21.0		
Barge Canal	1,148.2	RT 1,086.6		61.6	34.6	RT 26.2		8.4
		I 1,418.7				I 34.3		
		II 156.6				II 3.8		
		III				III		
		T 1,575.3				T 38.1		
Central Plains	2,440.3	RT 1,969.1		471.2	73.7	RT 47.6		26.1
		I 2,903.3				I 70.1		
		II 94.0				II 2.3		
		III 718.2				III 17.3		
		T 3,715.5				T 89.7		
Allegany Plateau	4,705.1	RT 4,644.4		60.7	163.4	RT 112.1		51.3
Total	31,673.3	21,566.0		10,107.3	977.3	520.8		456.5
			2000					
		I 10,552.1				I 203.9		
		II				II		
		III 3,313.8				III 64.0		
		T 13,865.9				T 267.9		
Metropolitan Areas	37,820.6	RT 17,332.3		20,488.3	1,135.0	RT 334.9		800.1
		I 1,086.6				I 21.0		
		II				II		
		III				III		
		T 1,086.6				T 21.0		
Barge Canal	1,928.3	RT 1,358.2		570.1	57.8	RT 26.2		31.6
		I 1,773.4				I 34.3		
		II 195.8				II 3.8		
		III				III		
		T 1,969.2				T 38.1		
Central Plains	3,494.3	RT 2,461.5		1,032.8	104.9	RT 47.6		57.3
		I 3,629.1				I 70.1		
		II 117.5				II 2.3		
		III 897.8				III 17.3		
		T 4,644.4				T 89.7		
Allegany Plateau	8,297.3	RT 5,805.5		2,491.8	249.1	RT 112.1		137.0
Total	51,540.5	26,957.5		24,583.0	1,546.8	520.8		1,026.0
			2020					
Metropolitan Areas	53,694.9	21,665.4		32,029.5	1,596.3	334.9		1,261.4
Barge Canal	2,665.1	1,697.8		967.3	79.3	26.2		53.1
Central Plains	5,319.3	3,076.9		2,242.4	158.2	47.6		110.6
Allegany Plateau	10,694.3	7,256.9		3,437.4	317.9	112.1		205.8
Total	72,373.6	33,697.0		38,676.6	2,151.7	520.8		1,630.9

APPENDIX B

Table No.		Page
B-1	Travel Time Limits and Net Resident Demand Expended within the Market Area by Percent of Activity Days.	B-1
B-2	Computing Total Summer Season Demand for Key Outdoor Recreation Activities (1960), Genesee River Basin.	B-5
B-3	Computing Total Summer Season Demand for Key Outdoor Recreation Activities (1980), Genesee River Basin.	B-8
B-4	Computing Summer Season Supply for Key Outdoor Recreation Activities (1960).	B-10
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B-6	Activities Comprising Recreation Days, Summer, Genesee River Basin Recreation Market Area.	B-14

Appendix B Methodology

A. Determining the Recreation Market Area.

The limits of this area were established by analysis of (1) user origin-destination data from western New York state parks; (2) travel time-distance from population centers in western New York; and (3) the distribution of existing public recreation areas in western New York and northwestern Pennsylvania. Approximately 90 percent of resident New York day users of Letchworth State Park (a highly attractive recreation area in the center of the Genesee Basin) orginated within the outlined area. No more than 2 hours driving time is required to reach nearly any point within the Basin from population centers in the outlined market area. The distribution of existing major day use public recreation areas which are expected to influence Basin proposals is contained within the market area as defined by (1) and (2) above.

Thr population residing within the market area is considered "resident"- all others as "non-resident." This consideration is significant in determining outdoor recreation demand and the importance of residential distinction will become apparent in classifying demand for outdoor recreation opportunity by resident/non-resident participants. The market area characteristics required to compute outdoor recreation demand, supply and needs were collected both on an economic subarea basis and on a county basis. However, the individual county as treated in this Study was not considered as a planning unit upon which to assess outdoor recreation needs. Since economic background is one of the primary determinants of participation in outdoor activities, it was concluded that an economic subarea would constitute the basis for study of outdoor recreation in the market area. Two data sources were consulted to determine recreation subareas of the market area: (1) Genesee River Basin Economic Base Study*, and (2) Erie-Niagara Basin Economic Base Study*.

B. Demand Methodology.

Demand for outdoor recreation opportunity was estimated for the base year 1960 and projected to 2020 for the following activities: boating, camping, picnicking and swimming. These activities were selected for analysis of demand (and supply) because: (1) they are considered key planning elements in current park development practices including outdoor recreation developments at water resource projects; (2) more specific information is available in park system inventories of current facilities provided for these activities as well as similar facilities programmed for the future; and (3) they provide a reliable index to the type and scale of facilities required; hence to the costs of recreation development. The assumption is that needs for outdoor recreation water and related land resources obtained from a demand/supply analysis of the above four key activities bears a reasonably consistent relationship to other activities.

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* New York State, Department of Conservation, Division of Water Resources, 1965

Needs Methodology treats in detail outdoor recreation activities which are considered key, complementary or associated elements in an urban or nonurban recreation development. At this point, however, the relationship among these elements can be briefly illustrated as follows:

Key Planning Activities	Complementary Activities	Associated Planning Activities
Boating	Bicycling	Attending Outdoor Events
Camping	Fishing	Golfing
Picnicking	Hiking	Playing Outdoor Games/Sports
Swimming	Horseback Riding	Winter Activities
	Hunting	
	Nature Study	
	Sightseeing	

Demand (and supply) estimates for the four key activities are expressed (from definitions) in activity days. The term activity day also implies actual or expected occupation of a facility, or in terms of needs, the provision of facilities whose occupancy is expected at a future date.

Various statistical reports issued by the Outdoor Recreation Resources Review Commission (ORRRC), particularly Report #19, the 1960-61 National Recreation Survey, provided the references from which participation or demand data were estimated. U.S. Census Region data were adjusted wherever possible to reflect conditions in the Genesee Basin recreation market area. Since the primary period of participation in boating, camping, picnicking, and swimming is summer, only the participation rates for that period were used.

The 1960-61 ORRRC participation rates for the Northeast Census Region were adjusted to reflect more adequately the conditions of the recreation market area by use of key socio-economic traits. These traits were median family income, education, and median age. Differences between the market area and Census Region were resolved by direct proportion which altered the ORRRC Northeast Census Region participation rates. The Regional and Area participation rates are shown below:

	Per Capita 1960 Summer Participation Rate	
	Northeast Census Region	Market Area
Boating	1.38	1.44
Camping	0.33	0.34
Picnicking	2.81	2.84
Swimming	6.82	6.87

Gross demand by key activity was calculated by multiplying recreation subarea populations by the market area participation rates for each activity.

Classification of Outdoor Recreation Visits.

Outdoor recreation visits were classified by ORRRC into summer season per capita outings, trips, and vacations. These may be expressed as use factors, or:

Day use outings	3.00 excursions/capita,	80.4%	of total summer use
Weekend trips	0.40 " "	10.7%	" " " "
Vacations	0.33 " "	8.9%	" " " "
TOTAL	3.73	100.0%	

The "use factors" offer an insight into gross demand by providing means to classify outdoor recreation excursions. However, the three use classes may be directly applied only to boating and swimming activities. Overnight camping excludes day use, while picnicking as a primary recreation purpose excludes overnight visits on weekends and vacations. A 1965 accumulation of data from Pennsylvania State-operated campgrounds indicated that 40 percent of weekly camping activity days took place on weekends; 60 percent during week days. The use-time classification of camping in Pennsylvania was adopted for the Genesee market area with the assumption that the 60 percent weekday use represented non-resident vacationers, 40 percent the resident weekend users. Picnicking was considered 100 percent day use by market area residents.

Distribution of Demand.

The above use classes of outdoor recreation have travel time limits. An understanding of these limits is essential in order to distribute demand by use classes. These limits are shown in Table B1. Since travel time in the market area is two hours (Appendix B, Part A), gross demand, by use class, was adjusted accordingly in order to estimate net resident demand.

APPENDIX TABLE B1 - Travel Time Limits and Net Resident Demand Expended within the Market Area by Percent of Activity Days.

Travel time limits (hours)	Net resident demand
Day use (0-2)	100%
Weekend use (1-5)	85%*
Vacation (2-9)	0%**

* Computed on the theory that weekend use is distributed according to the reciprocal of time-squared ($1/T^2$) up to the five hour limit (1 hr. - 68.5%, 2 hrs. - 85.6%--5 hrs. - 100%)

**Since vacation travel is assumed to require at least two hours, all vacation activity days originating in the Market Area were considered to be expended elsewhere.

Non-resident demand, was determined by assuming that the ratio between resident/non-resident demand was the same as the ratio between market area resident and non-resident current visitation in area state parks. Camping is regarded to be the most important of the four key activities in attracting non-residents to the market area. Letchworth State Park which is centrally located in both the Genesee Basin and the resident market area is an outstanding park which attracts nationwide visitation not only for camping, but other activities as well. Surveys at Letchworth State Park in 1964 revealed that 45% of tent and trailer campers originated from within the resident market area, 55% from elsewhere. At this point, it was assumed that (1) of the market area camping demand, 45% was resident, 55% non-resident; (2) 35% of non-resident campers were also boaters; (3) 100% of non-resident campers were potential swimmers; and (4) 100% of picnicking demand was resident.

Appendix Table B2 presents the methodology developed for the Genesee Study to estimate 1960 demand for the four key outdoor recreation activities.

Typical Summer Sunday.

June, July and August are the months of maximum participation in the key activities. However, this seasonal assessment of needs by analysis of demand/supply does not adequately measure use of recreation facilities occurring on holidays, weekends and weekdays. Thus, by the seasonal approach, there is a tendency to disregard variations occurring within the period, hence a tendency to overestimate opportunity available at any one time.

An approach to focus attention more precisely upon outdoor recreation needs is the demand/supply analysis for a typical summer Sunday. This is a term employed by recreation planners to describe a capacity use day during a summer week, and refers to the number of people for whom facilities must be provided during such a day. Usually, outdoor recreation development programs are keyed to providing facilities sufficient to accommodate demand on a capacity day excluding holidays.

Summer season (1960) demand estimates for the key activities were converted to a typical summer Sunday as follows:

(1) Resident day use - 80% occurs on weekends; 20% during week*
(2) Resident weekend use - 100% occurs on weekends (by definition)
(3) Non-resident vacation - 40% occurs on weekends, 60% during week**

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* Delaware River Basin Report, 1960
**Pennsylvania State Parks data, 1965 (unpublished)

APPENDIX TABLE B2 - Computing Total Summer Season Demand for Key Outdoor Recreation Activities (1960), Genesee River Basin.

RECREATION MARKET AREA (Resident)				ACTIVITY DAYS			
Population (county or subarea)	x	Participation Rate for Activity (summer)	= GROSS DEMAND	Boat	Camp	Picnic	Swim
-		-	- -	-	-	-	-
Total County - Population			Total	Boat	Camp	Picnic	Swim
			USE CLASS				
			Day use	80.4%		100%	80.4%
			Weekend use	10.7%	40%		10.7%
			Vacation	8.9%	60%		8.9%
			DISTRIBUTION (Travel Time)				
			Day use	100%		100%	100%
			Weekend use	85%	85%	0%	85%
			Vacation	0%	0%	0%	0%
			Total Resident Demand	Boat	Camp	Picnic	Swim
			Non-resident demand (based on non-res. camp = $\frac{\text{res.camp}}{0.45}$ = Total - res. camp)				
			(NRC = non-res. camp; RC = resident camp)				
			Total Non-resident Demand	35% NRC	122% RC	0	100% NRC
			Total Net Demand (summer)	Boat	Camp	Picnic	Swim

Total summer season activity days are divided by 13 to obtain a weekly estimate. From the above distribution of weekend and weekday recreation use, an estimate of activity days occurring on a typical summer Sunday were obtained as follows:

Percent of activity days occurring on peak day by use class

	Boat	Camp	Picnic	Swim
Day use (resident)	40%	0%	40%	40%
Weekend use (resident)	50%	50%	0%	50%
Vacation (non-resident)	20%	50%	0%	20%

Predicting Demand for 1980

Activity Participation Rates.

ORRRC Study Reports 19, 20 and 26 were utilized to project activity participation rates to 1980. (The actual ORRRC projection year nearest 1980 was 1976). The ORRRC Study Reports offered a means to compute the effect of assumed changes in socio-economic factors of age, income, and education to a projection coefficient which then could be applied to 1960 base participation rates. The ORRRC sources included two projection factors - "with opportunity" and "without opportunity." The opportunity factor assumes that an improvement in the 1960 quality and quantity of facilities available on a per capita basis will occur by 1980.

Projection of the 1960 participation rates to 1980 for the Genesee market area was based upon the ORRRC "with improvement" opportunity factor. A comparison of 1960-1980 market area summer season adjusted per capita participation rates for the four key activities follows:

	1960	1980
Boating	1.44	2.09
Camping	0.34	0.65
Picnicking	2.84	3.69
Swimming	6.87	9.41

Projected Distribution of Demand.

Travel time imposed as a constant on the use classes in 1960 was assumed to be the same in 1980 as it was in 1960. However, persons will be able to travel further during the same time span as a result of improved transportation systems. Also, increased leisure time and improved supply ("with opportunity") are expected which means a person might spend more time driving on weekends (up to the imposed five hour limit). Day use by market area residents was still considered to be expended within the area and resident vacationers to travel outside the area according to

travel time. The distribution of 1980 weekend use, however, is expected to differ from that of 1960. The significance of this difference is that more resident use will occur outside the two hour limit of the Genesee market area. The 1980 weekend use distribution was computed by assuming that increased leisure time, better transportation systems, and improved supply was tantamount to the exponent 1.5 of the reciprocal of time (1/t to the 1.5). Therefore, resident weekend use expended in the market area becomes 77% of the total activity days rather than 85%.*

The computation of 1980 non-resident demand followed the patterns of 1960 except that expected increases in leisure time and travel would result in a significant change in the ratio of residents to non-residents in the market area. It is assumed that the ratio of resident to non-resident campers (the basis for non-resident demand estimates) will be 25% to 75%. Thus, computed resident camping demand within the market area represents 25 percent instead of 45 percent of the total.

Table B3 illustrates the methodology developed for the Genesee Study to estimate 1980 demand for the four key outdoor recreation activities.

Typical Summer Sunday.

The approach to computing 1980 demand on a typical summer Sunday (peak day) was the same as that for 1960.

Predicting Demand for the Years 2000 and 2020.

For the year 2000, summer season demand was based upon ORRRC Study Report 26. Projection factors to compute summer season demand for the year 2020 were obtained from the Bureau's Washington, D.C. Office. Appendix Table B3 was utilized to determine both 2000 and 2020 summer season demand for the four key activities. Activity participation rates were adjusted to account for anticipated changes in income, education, and age distribution. A comparison of 1960, 1980, 2000 and 2020 summer seasons per capita participation rates follows:

	1960	1980	2000	2020
Boating	1.44	2.09	2.84	3.11
Camping	0.34	0.65	1.20	1.65
Picnicking	2.84	3.69	4.54	4.94
Swimming	6.87	9.41	12.43	14.08

The procedure for computing typical summer Sunday demand for the years 2000 and 2020 was the same as that for 1960.

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* 1 hour - 57%, 2 hours - 77% ... 5 hours - 100%

APPENDIX TABLE B3 - Computing Total Summer Season Demand for Key Outdoor Recreation Activities (1980), Genesee River Basin.

RECREATION MARKET AREA (Resident)				ACTIVITY DAYS			
Population (county or subarea)	x	Participation rate for activity (summer)	= GROSS DEMAND	Boat	Camp	Picnic	Swim
-		-	- -	-	-	-	-
Total County - Population			Total	Boat	Camp	Picnic	Swim
			USE CLASS				
			Day Use	80.4%		100%	80.4%
			Weekend use	10.7%	40%		10.7%
			Vacation	8.9%	60%		8.9%
			DISTRIBUTION (Travel Time)				
			Day use	100%		100%	100%
			Weekend use	77%	77%	0%	77%
			Vacation	0%	0%	0%	0%
				Boat	Camp	Picnic	Swim

Total Resident Demand
Non-resident demand (based on non res. camp = $\frac{\text{Res. Camp}}{0.25}$ = Total - Res. Camp

(NRC = non-res. camp; RC - res. camp)

Total Non-resident Demand	35%NRC	300%RC	0	100%NRC
Total Net Demand (Summer)	Boat	Camp	Picnic	Swim

C. Supply Methodology.

In the Genesee Study, market area supply or opportunity was evaluated in similar terms to those of demand. The terms are activity days and recreation days during a summer season and typical summer Sunday for the years 1960, 1980, 2000 and 2020.

Outdoor recreation space and facility standards were utilized to estimate supply in activity days for the four key activities. These standards represent some measure of tangible supply and introduce design load and capacity which are essential measures of two supply characteristics. Design load measures the number of persons that can be accommodated by recreation facilities at any one time. Capacity measures the number of activity days that can be accommodated during the course of a day or a season. The design load of a park or recreation area is a facility development guide for park planners and administrators to determine instantaneous service to a maximum number of persons. Theoretically, when this maximum is exceeded the "no vacancy" sign goes up.

If a picnic table can be used by two families during a day, the capacity of the table becomes twice that of the design load. Perhaps the term capacity is similar to the term efficiency in the business world, but few would care to use this comparison in the park and recreation field because of the difference in values. If it were possible to direct public use of a park so the area would be filled and evacuated periodically from a waiting line at the entrance gate, the capacity of facilities, hence the park, could be precisely recorded. This is not normal procedure today, and without such organized and recorded use, daily or seasonal capacity must be estimated. To do this, a planner estimates expected facility use considering:

(1) Anticipated persons per facility unit.
(2) Turnover rate (use of a facility by more than one person or group per day).
(3) Capacity days per week (typical summer Sunday a capacity day).
(4) Number of weeks during a season.

Appendix Tables A3 through A8 contain an inventory of outdoor recreation areas and facilities. Where sufficient data was available, an estimate of capacity in activity days was computed for the four key outdoor activities. At least some inventory data was available on a wide range of outdoor recreation activities and areas both public and private. Much of this data did not lend itself to a numerical analysis.

Appendix Table B4 presents the Genesee Study methodology utilized to estimate summer season supply in the Genesee River Basin market area for the base year 1960*. Typical summer Sunday supply is computed by multiplying (1) persons per facility unit, by (2) the daily turnover rate.

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* 1963-64 facility information is regarded as 1960 base supply.

APPENDIX TABLE B4 - Computing Summer Season Supply for Key Outdoor Recreation Activities (1960).

A Persons per facility
B Daily turnover (occupancy) rate
C Weekly use in equivalent capacity days
D Weeks of summer season
E Assumed surface acres per boat
E' Assume 70% swimmers on beach; 30% in water at one time

		A	B	C	D		
Boating							
1. Parking spaces	x	4	1.5	3	13*	= Activity Days, Summer Season	
2. Surface acres	x	$\frac{5}{5(E)}$	2	3	13	= "	"
3. Marina slips	x	5	-	3	13	= "	"
4. Rental boats	x	5	1.5	3	13	= "	"
Camping							
1. Camp sites (public)	x	5	-	5	13	= "	"
2. Camp sites (private)	x	5	-	3	13	= "	"
Picnicking							
1. Picnic tables	x	5	1.5	3	13	= "	"
2. Developed acres	x	50	1.5	3	13	= "	"
Swimming							
1. Beach (50 ft^2/person)	x	$\frac{43{,}560\ ft^2/acre}{50}$	1.5**	3	12	= "	"
		70%(E')					
2. Pool (20 ft^2/person)	x	$\frac{Ft^2}{20}$	1.5**	3	12	= "	"
General Parking Spaces (if only information available)	x	4	1.5	3	13	= "	"

Formulae: A = Design Load
A x B = Daily Capacity (typical summer Sunday)
A x B x C = Weekly Capacity (summer)
A x B x C x D = Summer Season Capacity

* corresponds with time element of demand
**assumed turnover of 2 in urban parks; 3 in urban pools

(Delaware River Basin Study, Design Load Equivalents used for measure of activities)

Projecting Supply - 1980

In many instances the programs and proposals of the public recreation agencies within the recreation market area were outlined either in the Nationwide Plan Inventory or on suggestions contained in published reports of individual areas such as land regions, counties, or cities. Some programs were slated to begin as early as 1963; others about 1970. However, it was assumed that all existing plus programmed outdoor recreation developments known at this time represented 1980 supply. Currently available information on opportunities provided by the Private Sector was regarded as at least that supply which would be available in 1980.

Appendix Table B4 was utilized to compute basic summer season and typical summer Sunday supply in 1980 for the four key activities. Basic supply represents expected use under present conditions. However, projected demand considered changes in socio-economic characteristics such as income, age, education, and leisure time. Since demand and supply are basically interrelated, it seemed reasonable that a factor estimating the effect of socio-economic change in 1980 (also 2000 and 2020) supply should be considered. ORRRC Study Report 26 pointed out that there will be an estimated 15 percent increase in camping activity as a result of available leisure time between the years 1960 and 1980; likewise, a 44 percent increase in leisure time between 1960 and the year 2000. It was assumed that these percentage increases constituted factors which would reflect an improvement in the "effectiveness" of computed 1980 and 2000 summer season supply. Thus, the 1980 seasonal supply computed from Appendix Table B4 was increased by 15 percent to reflect the socio-economic changes (from ORRRC 26). Improved supply is defined in this study as an assumed increase in summer season computed capacity as the result of an increase in leisure time. In effect, this means that the number of capacity days per week will increase by 1980 (and 2000) possibly by a longer weekend available, a shorter work day, or an extra holiday. The design load for a capacity day would not change, but the "plant efficiency" would be increased on a seasonal or annual basis.

Projecting Supply - 2000 and 2020

Tangible Supply is the planned or assumed acquisition and development of lands and waters--tangible meaning a facility for which a design load and capacity can be calculated. Currently assessed public and private outdoor recreation programs in the market area are expected to be completed and in operation by 1980. "Advanced" information concerning tentative plans for the interim 1980-2000 or 2020 is not available. Even if such information were available, it would be unsafe to conclude that these plans would not have to be altered considerably to meet conditions of the future. Thus, for purposes of this study, 2000 supply was estimated by projecting the 1980 tangible supply with an improvement factor based on ORRRC Study Report 26 (or the difference between 15 and 44 percent which is 25 percent rounded). 2020 supply was estimated similarly to that of 2000. A seasonal improvement factor of 25 percent was added to 2000 supply. However, typical summer Sunday supply remained the same.

D. Needs Methodology.

Recreation Days. A recreation day usually involves participation in more than one activity per outing, trip or vacation. If total activity days are known, they may be divided by an assumed number--activity days per recreation day--to determine recreation days.

The assumed number of activity days comprising a recreation day varies greatly among planners. There is realistically great latitude in choice among the user-public for activities as well as the type area in which they will recreate. It is possible for the recreator to participate in only one activity during a day--attending a football game; or many--visiting a park offering a variety of activities. Therefore, it would appear that activity days comprising recreation days should be keyed to the park and recreation systems offering opportunity. Current development concepts by park and recreation administrations in the market area are not expected to change materially in the foreseeable future. Operating techniques and construction design may change, but the respective roles of the city, county, or state systems in providing their characteristic opportunities is expected to continue at least to 1980. Public park and recreation systems together with their characteristic development themes are presented in Appendix Table B5. Some allied agencies with associated developments are also included. It should be noted that outdoor recreation opportunity is subsidiary or at best potential in some publicly-administered areas.

There appears to be two basic characteristics among the several park and recreation systems which might summarize their opportunities offered. These characteristics are day use opportunity and overnight use opportunity. For purposes of this report, day use areas are termed "user-oriented," and overnight opportunity areas are termed "resource-oriented." Appendix Table B6 contains those activities characteristic of user and resource-oriented outdoor recreation areas.

The number of activity days comprising recreation days in user and resource-oriented areas were determined by an equation which utilized the relative weights of ORRRC summer participation rates for those activities considered endemic to the two recreation area opportunity classes. The number of activity days per recreation day for a select group of activities is assumed to be proportional to the number of activity days per recreation day for all summer activities listed by ORRRC. The proportional equation was solved to convert the summer participation rates to recreation days for selected activities provided by the user and resource-oriented areas. In summary, it is assumed that the relative proportion of total summer activities considered by ORRRC Study Report 19 (Tables 1.02.02 - 1.02.18) to total recreation days bears a similar relationship for those activities comprising the total recreation experience of the user and resource-oriented developments. An equation follows on page B-15.

APPENDIX TABLE B5 - Common Park and Recreation Administrations and Characteristic Development.*

CITY PARKS AND RECREATION CLASSES

Playlots
Playground (neighborhood park usually with elementary school)
Playfield (usually associated with high school level)
Large Parks (active recreation incorporating natural features)
Special Parks (parkways, waterways, zoos, gardens, esthetic treatments)
Reservations and Preserves (rustic-wild areas--not intensively developed)
Regional Recreation Areas (lake, river or reservoir--outdoor recreation facilities)

METROPOLITAN AND COUNTY SYSTEMS

Large Parks Special Parks Reservations and Preserves Regional Recreation Areas	Emphasis on natural features but recognizing demands of population centers for active recreation. These systems often incorporate large city parks and together with county parks form "Greenbelts" or administrative park districts.

STATE PARK AND RELATED SYSTEMS (Travel time-distance most significant)

The State Park (resource-oriented)
The State Recreation Area (user-oriented)
Access Areas, Leases, and Easements (state conservation agencies)
Other State Lands (reservations--recreation subsidiary)

FEDERAL RECREATION OPPORTUNITIES

The National Parks (resource-oriented, historical interpretation, seashores, National Recreation Areas)
The National Forests (resource-oriented, National Recreation Areas)
Water Resource Agencies
- U.S. Army, Corps of Engineers Reservoir Projects
- U.S.D.A., Soil Conservation Service, Watershed Projects
- U.S.D.I., Fish and Wildlife Service, Wildlife Refuges, Fish Hatcheries

Other Federal Lands
- General Services Administration, Surplus Federal Real Property
- Military Reservations, exclusive-use recreation for resident personnel
- Indian Reservations, general recreation lands (Note: May not be totally Federal land)

* Adapted from Park and Recreation Administration, Charles Doell, 1963, Burgess Publishing Company, 340 pp.

APPENDIX TABLE B6 - Activities Comprising Recreation Days, Summer, Genesee River Basin Recreation Market Area.

User-Oriented Key Activities	Resource-Oriented Key Activities
Playing Outdoor Games and Sports	Boating
Picnicking	Camping
Swimming	Picnicking
	Swimming
Associated Activities*	**Associated Activities***
Sightseeing	Driving for Pleasure
Walking for Pleasure	Sightseeing
	Walking for Pleasure
Replacement Activities**	**Replacement Activities****
Attending Outdoor Concerts & Drama	Bicycling
Attending Outdoor Sports Events	Canoeing, Sailing; non-motor boating
Bicycling	Fishing
Canoeing, Sailing; non-motor boating	Horseback Ricing
Driving for Pleasure	Nature Walks
Horseback Riding	Playing Outdoor Games & Sports
Nature Walks	Water Skiing
	Hiking on Trail w/pack

* Consistent participation each visit.
**Concerted participation in any of these activities will replace one key activity in terms of time spent during a day.

$$\frac{Y1 - Y2}{X1 - X2} = \frac{B - Y2}{A - X2}$$

where, in solving for "A":

Y1 = sum of annual activity days per person (19 activities from ORRRC 19)

Y2 = the highest per capita participation rate of the 19 activities

X1 = sum of the summer season recreation days per person for the Northeast Census Region (from ORRRC 19)

X2 = 1 recreation day per person to equate an activity day with a recreation day

B = sum of summer season activity days for the resource-oriented activities selected in the Genesee report

A = conversion factors of activity days to recreation days (selection of activities comprising resource-oriented development)

The resulting conversion factors of activity days to recreation days were:

resource-oriented - 4.23 activity days per recreation day
user-oriented - 3.93 " " " " "

In the metropolitan areas, swimming needs were the focal point of design. For the other subareas, both swimming and boating needs were focused upon. The metropolitan areas were assumed to characterize 1980 user-oriented opportunity, the other subareas resource-oriented opportunity (from Table B6). A further assumption was made that all swimming needs would be estimated by beach-type development required (opposed to pools), and that pleasure boating needs (unlimited horsepower) would have to be met in subareas other than the interior of the metropolitan areas whose suburban growth practically precludes the acquisition and development of large areas for outdoor recreation.

The next step was to compute a ratio between per capita participation (by ORRRC rate in this case) in all activities of the use-classes and the key activity(s) in each class. Thus, total summer per capita participation for each class area divided by the summer per capita swimming rate (user-oriented) or the combined boat-swimming rate (resource-oriented) yields a "factor" which in effect means that total activity days by class are now a design function of the water-oriented activity(s) needs and may be computed by: total activity days needs for key activity x "factor" equals total needed activity days for the subarea. Hence, the metropolitan areas' swimming activity days needed for a typical summer Sunday, 1980, were multiplied by the above direct ratio to determine total activity days needed by 1980. Needed recreation days by opportunity class were

determined according to the activity days per recreation day computed above. Estimated recreation days for the year 2000 and 2020 were similarly computed. For example: Resource-oriented area,

$$\frac{\text{B (from above)}}{\text{boat + swim}} = \text{factor of water-oriented activity(s) to all activities by class (seasonal)}$$

(seasonal activity days)

Hence:

Needed activity days boat + swim x "factor" divided by 4.23 activity days per recreation day = recreation days.

Demand and supply estimates in activity days for the water-oriented activities boating and swimming - 1960 to 2020 - were similarly utilized to convert total demand ans supply estimates to recreation days.

Although recreation days needed are not converted into resource requirements, potential outdoor recreation resources were evaluated in terms of expected annual visitation, hence recreation days, and visits on a typical summer Sunday. The importance of expressing needs in recreation days as well as in units of land and water is that some small areas, intensively developed, offer substantial opportunity in terms of recreation days (or potential visits). The total acres of land and water provided in small recreation areas would not materially reduce estimated outdoor recreation needs in the total aspect.

Resource Requirements.

Public park and recreation systems usually do not design entire areas exclusively for one or two activities. Available space and opportunity determine the ultimate design, and wherever possible a variety of opportunity is planned. Boat access, fishing, and hunting areas are some exceptions in the multi-activity design for land and water areas. The State Conservation Department of both New York and Pennsylvania provide areas or access to areas for the above activities. However, needed acres of land and water will be estimated by subarea and will consider multiple opportunity development.

Acres of land required to meet needs were estimated by the use of spatial standards required to support camping, picnicking, boat launching, and swimming at a beach. Total acres of water required were based upon unrestricted boating (no horsepower or water skiing limitations).

The acres of land required to support the four activities above were doubled in order to provide opportunity for other activities.

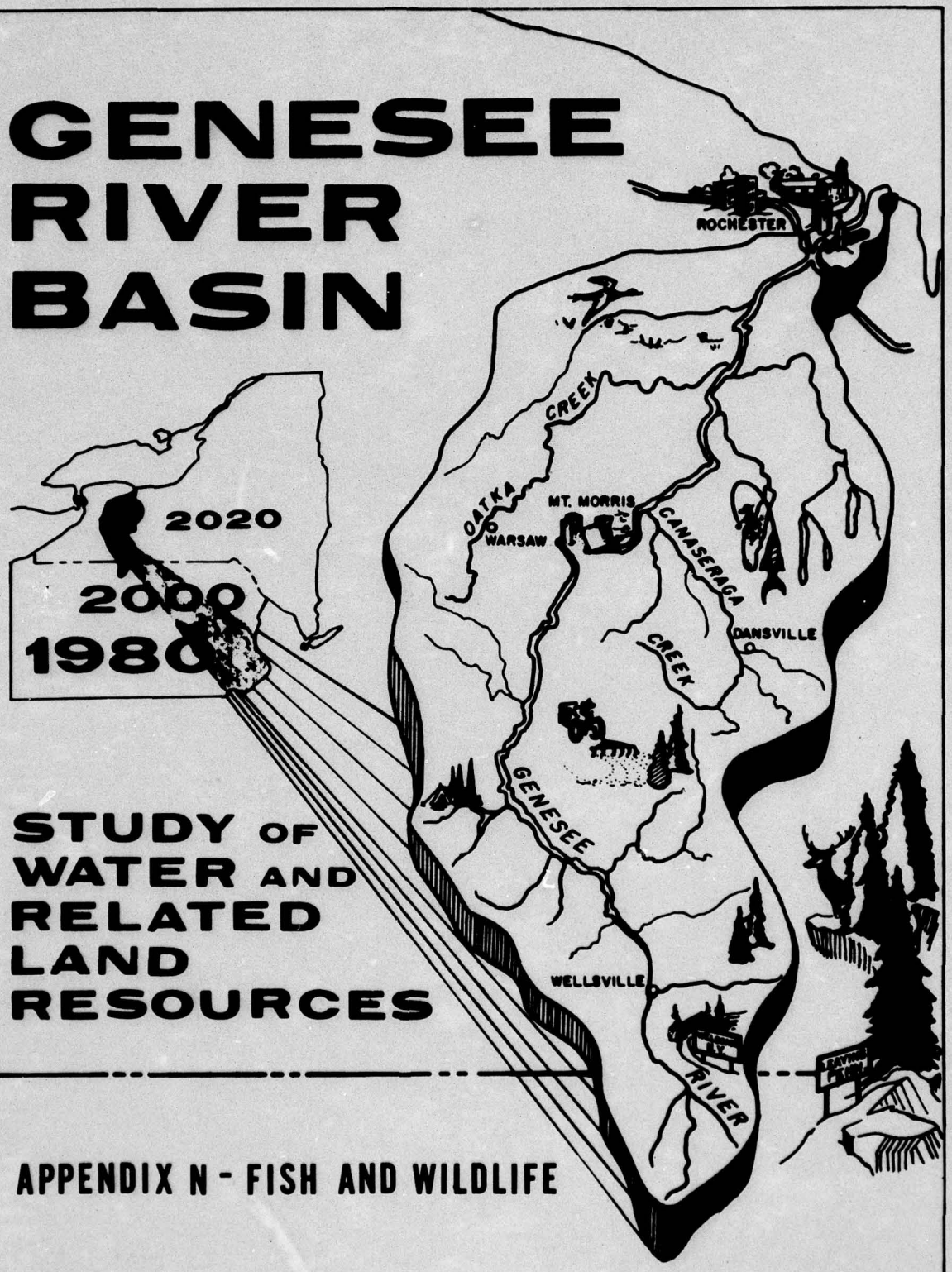
In addition, to arrive at total lands required, a land development factor was introduced which estimated a management unit e.g. allowances for buffer zones and esthetic resources.

An example of estimating lands and waters required for the market area on a typical summer Sunday, 1980, follows:

	Acres	
	Land	Water
Boating		
179,000 activity days needed		
5 persons per boat x turnover of 2 = 10 (capacity)		
179,000/10 = 17,900 boats @ 5 acres per boat =		89,400 (rounded)
1 car-trailer per boat, or 17,900 car-trailers @ 50 units parking per acre = 358 acres (round)	360	
Camping		
12,600 activity days needed		
5 persons per site x turnover of 1 = 5 (capacity)		
12,600/5 = 2,520 sites @ 8 sites per acre = 315 acres		
315 acres @ 25% development =	1,260	
Picnicking		
100,500 activity days needed		
5 persons per table x turnover of 1.5 = 7.5 (capacity)		
100,500/7.5 = 13,400 tables @ 10 per acre = 1,340 acres		
1,340 acres @ 1/3 development =	4,020	
Swimming		
456,500 activity days needed		
Assume 70% on beach, or 319,550 @ a turnover of 1.5 = 213,000 (capacity) @ 50 Ft.^{2} per person = 245 acres $\left(\frac{43{,}560 \text{ Ft.}^2/\text{acre}}{50 \text{ Ft.}^2/\text{person}}\right)$		
Acres beach (245) x 2.83 (for total development)	700	
Sub-total	6,340	89,400
6,340 x 2 (allowance for other activities)	12,680	
12,680 @ 40% total development	31,700	
Total	31,700	89,400

Note: Appendix Table All indicates some surpluses among the subareas for camping and picnicking. To compensate for these surpluses, the total market area needs for these activities on a typical summer Sunday were computed and distributed equally among the four subareas.

GENESEE RIVER BASIN



STUDY OF WATER AND RELATED LAND RESOURCES

APPENDIX N - FISH AND WILDLIFE

Charles H. Meacham, Commissioner

APPENDIX N

FISH AND WILDLIFE RESOURCES

GENESEE BASIN

PREPARED FOR THE COORDINATING COMMITTEE BY THE
BUREAU OF SPORT FISHERIES AND WILDLIFE
IN COOPERATION WITH THE
NEW YORK STATE DIVISION OF FISH AND GAME
WITH ADVICE AND COUNSEL OF TASK GROUP NUMBER NINE

AD-A041 708 CORPS OF ENGINEERS BUFFALO N Y BUFFALO DISTRICT F/G 8/6
GENESEE RIVER BASIN COMPREHENSIVE STUDY OF WATER AND RELATED LA--ETC(U)
DEC 69

UNCLASSIFIED NL

4 OF 5
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A041 708



The comprehensive study of water and re
Basin, New York and Pennsylvania, was a
Senate Committee on Public Works, Febru

This appendix to the report on the Gene
dix N, Fish and Wildlife Resources, was
Fisheries and Wildlife of the U. S. Fis
eration with the Division of Fish and G
vation Department and the Fish and Game
of Pennsylvania (although the small por
naturally required only minor involveme
Participation of the Bureau of Sport Fi
authority of the Fish and Wildlife Coor
amended; 16 U.S.C. 661-666 inc.).

The Genesee Basin Coordinating Committe
facilitate coordinated effort among the
Group No. 9, Fish and Wildlife, include
lowing: Bureau of Sport Fisheries and
State Conservation Department; Pennsylv
U. S. Soil Conservation Service; Corps
Recreation; and Federal Water Pollution
exchange of information and constructiv
deliberations of Task Group No. 9 were
the data, analyses, and plans presented

Planning efforts were directed toward t
fish and wildlife resources were concer
present and future needs for recreation
and wildlife resources and (2) to encou
additional resources to meet these need
augment the overall economy of the Basi
tives could best be accomplished by emp
in the order of priority listed:

a. Creation and development of ne
the southern portion of the Basin and (

b. Creation and development of ne
the southern portion and (2) in the nor

c. Creation and development of ac
possible;

d. Creation of additional stream-
elimination of pollution; and

e. Improvement in the quality and
through low-flow augmentation.

FINDINGS AND CONCLUSIONS

In the 2,479 square-mile area of Genesee Basin, there is an excellent variety of fish and wildlife resources and these are still moderately abundant in relation to the demands made upon them for various types of recreational use. There are also many opportunities whereby these resources could be augmented and thus a great potential exists for meeting increased future demands for recreation and thereby bringing about a monumental contribution to the overall economy of the Basin. Without purposeful action, however, to take advantage of these potentials, there will occur an ever-widening gap between supply and demand.

The needs to be served are not only those of the people residing within the Basin in the counties of Orleans, Genesee, Wyoming, Allegany, Monroe, Livingston, Ontario, and Steuben in New York and Potter County in Pennsylvania. They include a significant part of the needs of those who reside in the portions of these counties which lie outside the Basin and (perhaps to an even greater extent) of residents of the contiguous counties of Niagara, Cattaraugus, Erie, and Wayne. The combination of the Basin and these outlying areas is considered to be the "service area" for the fish and wildlife resources of the Genesee valley.

The 1960 population of the service area was 2.4 million people; projections indicate it will reach 3.2 million by the year 1980 and 4.6 million by the year 2020. Comparable figures for the population within the Basin only are 425,000, 570,000, and 880,000. Seventy percent of these people dwell in the Ontario Lake Plains region. Populations will become increasingly urbanized and, as such, will need and will seek the countering influence of recreation in the out-of-doors to an extent even greater than at present. Their seeking will be facilitated, undoubtedly, by a generally higher level of affluence and the availability of more leisure time as the years go by.

At present there are extensive lake-type fisheries in the northern portion of the Basin, comprised of many important species of game fishes, including the pikes, pike-perches, and basses. In addition, lake and rainbow trout are present in Hemlock, Canadice, and Rushford Lakes. On the other hand, lakes in the southern portion of the Basin are few and relatively small.

Various reaches of the Genesee River and its tributaries provide warmwater or trout fisheries, depending upon habitat conditions. These fisheries range in quality from fair to excellent. The trout fisheries, however, are in general dependent upon annual stocking to provide satisfactory fishing.

Wildlife resources include the small-game (the upland-game) species of the farms and woodlands - pheasants, squirrels, ruffed grouse, woodcock, and the snowshoe rabbit (that is, the varying hare). Deer are abundant and bear are present, although not in great numbers. Waterfowl were once abundant on the flood plains of Genesee River and its major tributaries, but flood control and land-use changes have largely eliminated suitable habitat. "Groveland Flats" on Canaseraga Creek is the most significant remnant of waterfowl habitat remaining.

Recreational use of the Basin's resources for fishing and hunting at the time this comprehensive study began was 362,000 fisherman-days and 640,000 hunter-days, annually. This use involved 80,000 fishermen and 60,000 hunters. By 1980, those seeking fishing opportunities in the Basin will number 136,000 and the extent of their use (if the resources are available to support it) will amount to 2.1 million man-days, annually. By the year 2020, these figures will have increased to 250,000 fishermen and 3.9 million fisherman-days.

Similarly, by 1980, 98,000 hunters each season can be expected to seek hunting recreation in Genesee Basin - their days afield will total 1.3 million, annually. These figures, by 2020, will have grown to 177,000 hunters and 2.3 million hunter-days. Of these, 16,000 in 1980 and 28,000 in 2020 can be expected to be waterfowl hunters and their demand for hunting opportunity will equal 65,000 man-days in 1980 and 140,000 in 2020. Recreation related to wildlife, other than hunting, is also expected to increase substantially over the years; such activities as bird-watching, wildlife photography, etc. are rapidly gaining participants at the present time.

Provided this prospective use is not lost to the Genesee Basin through failure to conserve and develop the resource base, estimated expenditures of fishermen and hunters in the Genesee Basin in the year 1980 will amount to $6 million and $7.6 million a year, respectively; comparable figures in the year 2020 will amount to $20.6 and $12.1 million. These figures are in terms of 1960 dollar values; they are a measure of the present and potential magnitude of an annual market for goods and services (in terms of gross expenditures) which ranges from $13.6 million in 1960 to $32.7 million in 2020. The extent to which this potential market will be tapped to enhance the overall economy of the Genesee Basin rests largely with the people of the Basin and the efforts they are willing to put forth to exploit it.

With adequate public support, the Division of Fish and Game in New York State and the Fish and Game Commissions of the Commonwealth of Pennsylvania will be able by 1980 to raise present capabilities of the Basin's fishery resources to the level of supporting 715,000 man-days of use. Present capabilities of the wildlife resources, especially waterfowl, to provide opportunities for hunting and other recreational uses will be maintained. These things will be done as a part of the on-going

state programs. Their accomplishment is a vital part of - is essential to - the success of any plan for meeting future needs, since the beneficial aspects of such a plan insofar as fish and wildlife and related recreation are concerned could easily be nullified by loss of existing resource capabilities.

The rate of increase in needs related to fish and wildlife, however, is too rapid to be met entirely by the normal management and development programs of the responsible state agencies. If a large measure of the anticipated needs of 1980 are to be served, then such programs will have to be augmented very substantially by early institution of measures to overcome specific problems.

For fisheries the important problems are lack of public access, pollution, periods of extremely low or extremely high flows, use of surface waters for irrigation, and an insufficient amount of fishery habitat.

Wildlife resource capabilities for meeting needs also are limited by lack of public access in addition to destruction or alteration of wildlife habitat in general and the deficiency of waterfowl habitat in particular.

The Fish and Wildlife Service and the New York State Division of Fish and Game, after consultation with other members of Task Group No. 9, selected from among the available options those structural and non-structural measures best suited to meet the needs for recreational opportunities related to fish and wildlife resources by the year 1980 and to supplement the overall economy of the Basin where it seemed most needed. The capability of existing resources augmented by the creation and development of new habitat under this plan would make available 2.0 million man-days of fishing opportunity by 1980, or 95 percent of the anticipated demand for 2.1 million man-days, and 51 percent of the anticipated demand, 3.9 million man-days, in 2020. Under this plan, also, there would be 14,700 days of waterfowl hunting available by 1980, or 22.6 percent of the estimated demand - a small percentage but still a very significant improvement.

The comprehensive plan provided in large part for accomplishment of the objectives outlined in the single-purpose fish and wildlife plan and this is indicative of the objective coordination of interests that characterized the Genesee study throughout. Analysis of the impact of the comprehensive plan on fish and wildlife resources reveals that it will add 381,500 man-days of fishing opportunity, annually, to the capability of existing resources (715,000 fisherman-days), making a total of 1,096,500, or 52 percent of anticipated 1980 needs. It will improve waterfowl hunting opportunities to the extent of 3,800 hunter-days annually, but will cause a loss of 21,500 man-days of upland-game and big-game hunting. Additional waterfowl concentrations will attract an additional 22,800 man-days of bird-watching, so that the total man-days of this type of recreation will amount to 37,800.

The major difference between capabilities for meeting 1980 needs under the comprehensive plan as compared to the fish and wildlife plan can be attributed in great measure to the omission of large dams and reservoirs on the main stem and tributaries from the former. The fish and wildlife plan included construction of Stannard and Tuscarora dams and reservoirs which together would have provided 216,000 man-days of trout fishing annually and the Portage dam and reservoir which would have been able to handle 492,300 man-days of warmwater fishing.

Although these facilities were omitted from the comprehensive plan as being not economically justified, their combined potential represents 34 percent of the anticipated 1980 needs related to fisheries. In comparison to the annual dam and reservoir costs amounting to $1,180,000 for Stannard, $590,000 for Tuscarora, and $1,300,000 for Portage, net annual benefits from potential fishing use amount to $586,000, $258,400, and $294,700, respectively. Without these major structures, needs for fishing opportunities for 1980 or subsequent years cannot be met in the Genesee Basin.

The potentials of the comprehensive plan could be more fully realized, however, by adoption of the means and measures discussed in the final chapter of this appendix. As modified by these means and measures, an additional 307,000 man-days of fishing opportunity could be provided annually. The total capability of the fishery resources in 1980 would thus amount to 1,403,000 fisherman-days or 67 percent of the anticipated 1980 demand. There would also be developed the opportunity for 6,000 more waterfowl hunter-days, making the total capability of the waterfowl resources 13,100 man-days, which amounts to 20 percent of 1980 needs.

The capability of fish and wildlife resources of the Genesee Basin for providing man-days of recreational opportunity in the year 1980 under each of the three plans is tabulated on page N-viii. The conservation and development of existing resources is considered to be an integral part of any plan, and this would provide the man-days of hunting and fishing opportunity listed in columns one and two. The gains anticipated from the fish and wildlife plan are shown in columns three and four; those from the comprehensive plan in columns seven and eight; and those from the modified comprehensive plan in columns eleven and twelve. The total capability under each of these plans is shown in columns five and six, nine and ten, thirteen and fourteen; these totals represent the sum of the gains made under each plan plus the figures in columns one and two.

As analyzed by Task Group No. 9, the comprehensive plan included 35 upland reservoir sites, among which seven were designated as single-purpose recreation structures. Four of these will be valuable for fisheries and the other three for waterfowl, without sacrificing general recreational values. One was designated a single-purpose irrigation facility; it will have a large fishing-use potential, even allowing for the effects of irrigation drawdown. Fourteen were described

as single-purpose fish and wildlife structures; these will undoubtedly have more or less value for general recreation, also, which properly administered would not be incompatible with maximum fish and wildlife development. Such single-purpose designations could be somewhat misleading. Analysis of the impact of the comprehensive plan, therefore, was in all cases based upon full use of the fish and wildlife resources expected to develop unless otherwise stated.

The plan includes 29 upland reservoir sites located on the Ontario Lake Plain. These sites lie outside the Genesee Basin and were not investigated by fish and wildlife interests sufficiently to be able to fully appraise their impact; further study of them should be made before any is authorized for construction, so that possible losses might be prevented or mitigated and any potentials for enhancement can be realized.

Finally, it should be recognized that the practicability of the comprehensive plan or any other plan involving the upland reservoir facilities within Genesee Basin designed by the Soil Conservation Service is questionable under existing Federal law and policy. This is so because only those facilities which include flood control or agricultural water management as a primary purpose are eligible for implementation with Federal cost-sharing under the programs presently authorized. Only five of the 35 upland reservoirs analyzed would fall within either category of eligibility.

Fish and Wildlife Resource Capabilities for Meeting 1980 Needs in Man-Days of Recreational Opportunity

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	Full Use Pres. Res.		Fish and Wildl.Plan		Total With F&W Plan		Comprehensive Plan		Total With Comp. Plan		Comp. Plan Modified		Total Comp. with Mods.	
	Fish	Wildlife	Fish	Wildlife	Fish	Wildlife	Fish	Wildlife	Fish	Wildlife	Fish	Wildlife	Fish	Wildlife
Region 1														
Trout Streams	70,000		8,800		78,800				70,000		12,000		82,000	
Trout Lakes			157,000		157,000		102,300		102,300		36,600		138,900	
Warm-Water Str.	6,000		60,400		66,400				6,000		60,300		66,300	
Warm-Water Lakes	574,000		106,900		680,900		82,400		656,400		67,200		723,600	
Hunting:														
Waterfowl		3,000		10,000		13,000		3,800		6,800		3,000		9,800
Other Species		934,500				984,500		-1,200		983,300				983,300
Sub-total Region 1	650,000	987,500	333,100	10,000	983,100	997,500	184,700	2,600	834,700	990,100	176,100	3,000	1,010,800	993,100
Bird Watching		15,000		29,800		44,800		22,800		37,800				37,800
Region 2														
Trout Streams	22,000		16,700		38,700				22,000		24,900		46,900	
Trout Lakes	42,000		246,000		288,000		69,500		111,500		43,200		154,700	
Warm-Water Str.	1,000				1,000				1,000				1,000	
Warm-Water Lakes			683,600		683,600		120,500		120,500		56,100		176,600	
Hunting:														
Waterfowl		300		1,400		1,700				300		3,000		3,300
Other Species		649,500				649,500				649,500				649,500
Sub-total Region 2	65,000	649,800	946,300	1,400	1,011,300	651,200	190,000		255,000	649,800	124,200	3,000	379,200	652,800
Lake Plains Hunting								-20,300		-20,300				-20,300
Pennsylvania Warm-Water Lakes							6,800		6,800		6,700		13,500	
Grand Totals	715,000	1,637,300	1,279,400	11,400	1,994,400	1,648,700	381,500	-17,700	1,096,500	1,619,600	307,000	6,000	1,403,500	1,625,600
Percent of 1980 Needs	34%	126%	61%	1%	95%	127%	18%	-1%	52%	125%	15%	-	67%	125%

RECOMMENDATIONS

In order to realize maximum benefits from and facilitate implementation of the early action phase of the Genesee Basin plan, it is recommended:

1. That there be no authorization to construct the 29 upland reservoirs on the Ontario Lake Plain until the Fish and Wildlife Service and the New York Division of Fish and Game shall have had opportunity to fully investigate the impact of these reservoirs and the accompanying increase in irrigated farming upon fish and wildlife resources of the Lake Plain and recommend means and measures for conservation and development of such resources in connection therewith.

2. That access facilities consisting of paved parking areas capable of accommodating 30-40 cars and boat trailers, together with launching ramps and necessary sanitary facilities, be constructed as an integral part of project development at the sites listed on page N-xii for which parking and launching facilities are indicated.

3. That fishing piers in the shape of an inverted "L" or "T", with at least 300 feet of their total length extending out over water four feet or more in depth, be constructed as an integral part of project development at the sites listed on page N-xii for which fishing piers are indicated.

4. That preimpoundment species control programs followed by reservoir stocking with game fish species be an integral part of project development at the sites listed on page N-xii for which species control and stocking programs are indicated.

5. That aquatic weed control programs be conducted periodically as may become necessary at Sites 5-21 and 13-6 as an integral part of the management of those reservoirs.

6. That appropriate zoning regulations either on an area of use or time of use basis be made an integral part of the operating plans for the sites listed on page N-xii for which zoning is indicated and for other multiple-purpose or single-purpose reservoirs where fisheries or wildlife resources might not otherwise be used to the fullest extent possible.

7. That Sites 1-5, 10-2, and 10-14 not be considered single-purpose general recreation reservoirs, but be managed also for recreation based upon fish and wildlife resources under such regulations as may be necessary to avoid conflict between uses.

8. That Sites 5-21 and 13-1 not be considered single purpose fish and wildlife reservoirs but be managed also to permit general recreation uses under such regulations as may be necessary to avoid conflict between uses.

9. That Site 17-19 not be considered a single-purpose irrigation reservoir, but that it be managed also to obtain maximum fishery benefits compatible with its functions as an irrigation water supply reservoir.

10. That a water master be appointed by the State of New York to regulate use of available water from Site 17-19 in the best interests of both irrigation and fish and wildlife in accordance with predetermined guidelines.

11. That design and operation of Site 18-7 incorporate provisions for low-flow augmentation in Oatka Creek to the extent of four cubic feet per second for the period July 1 through October 31, annually, to prevent loss of brown trout spawning habitat.

12. That the actions necessary to clean up 19 miles of trout streams and 40 miles of warm-water streams be made a specific part of the comprehensive plan by (a) obtaining letters of intent from those agencies or individuals responsible and (b) establishing a schedule of completion dates for action in the various reaches affected.

13. That access strips be provided through acquisition in fee simple title or perpetual easements for a total of 99 miles along 19 different fishing streams at an estimated cost amounting to $242,500, to be financed from appropriate State and Federal funds.

14. That access to streams be further facilitated by provision of parking areas, each capable of accommodating 20 cars and equipped with necessary sanitary facilities, in the four-mile reach downstream from Site 5-21 on Brimmer Brook and in the four-mile reach of Sugar Creek downstream from Site 13-6.

15. That the design of Site 7-2 on Black Creek be such that the maximum level of beneficial storage will be at elevation 1705, so as not to destroy but to improve waterfowl habitat.

16. That parking areas adequate to accommodate 30-40 cars and boat trailers, together with necessary sanitary facilities but without launching ramps, be provided to facilitate waterfowl-hunting use at sites indicated on page N-xii under waterfowl resources.

17. That appropriate zoning regulations either on an area of use or a season of use basis be made an integral part of the operating plans for those sites indicated on page N-xii for which zoning to prevent conflict between waterfowl hunting and other uses is necessary.

18. That lands acquired in connection with the construction and operation of upland reservoir sites and the surface of the impounded waters be open to free public access and use for fishing and hunting, except such areas as are excluded for reasons of public safety or project operations.

19. That lands upon which waterfowl habitat development is to be carried out in connection with the Canaseraga Project, Corps of Engineers, be acquired in fee simple title by the Federal Government and subsequently made available to the New York State Division of Fish and Game for waterfowl management under a General Plan in accordance with the provisions of the Fish and Wildlife Coordination Act.

Improvement or Management Measures Required
Upland Reservoirs, Genesee Basin Plan
New York and Pennsylvania

Reservoir Sites Fishery Resources	Parking & Launching	Fishing Piers	Spp. Control & Stocking	Aquat. Weed Control	Zoning to Obtain Max. Use	Zoning re Waterfowl Use
1-5 Pa.	1 Unit	1	X		X	
3-1	1 "					
3-4	1 "	1				
5-1	1 "	1	X		X	
5-21	1 "	1	X	X		
7-1 1/	1 "					X
7-2 1/	3 Units	8				X
8-13	1 Unit					
9-3	1 "					
10-2	1 "	1	X		X	
10-3	1 "					
10-14	1 "		X		X	
11-2	1 "					
11-4	1 "					
13-1	1 "	1	X		X	
13-6	1 "	1	X	X	X	
13-22	1 "					
13-24	1 "					
14-4	1 "	1	X			
17-1	1 "					
17-7	1 "					
17-8	1 "	1				
17-12 1/	2 Units	1				X
17-19 1/	3 Units	2	X		X	X
17-24 1/	1 Unit	1	X		X	X
19-7	3 Units	1				
Waterfowl Resources						
15-2	2 Units					X
16-2	1 Unit					X
19-11	2 Units					X
20-2	1 Unit					X

1/ Also used by waterfowl hunters

APPENDIX N

GENESEE BASIN STUDY

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GENESEE RIVER BASIN COMPREHENSIVE STUDY
OF WATER AND RELATED LAND RESOURCES
APPENDIX N
FISH AND WILDLIFE RESOURCES

INTRODUCTION

1. The comprehensive survey of water and related land resources, Genesee Basin, New York and Pennsylvania, authorized by Resolution of the Senate Committee on Public Works, February 1, 1962, includes within its scope consideration of fish and wildlife resources, their abundance, their present use, their capability for meeting needs of the future, and their relationship to the economy of the Basin.

2. Responsibility for investigating and reporting on this aspect of the survey rests with the Fish and Wildlife Service, Department of the Interior, at the Federal level and with the fish and wildlife agencies of the respective states. This appendix to the Genesee Basin Comprehensive Survey report, accordingly, has been prepared by the Bureau of Sport Fisheries and Wildlife, Fish and Wildlife Service, in cooperation with the Division of Fish and Game, New York State Conservation Department, and the Fish and Game Commissions of the State of Pennsylvania (although in the case of the latter, the area involved is such a small part of the Basin that participation has naturally been of a relatively minor nature).

3. The Bureau of Sport Fisheries and Wildlife participated in the Comprehensive Survey under authority of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661-666 inc.). Previous reports on projects in the basin, prepared by this Bureau in cooperation with the state fish and game agencies, are listed in attachment "A".

PERTINENT CHARACTERISTICS OF THE BASIN

PHYSIOGRAPHIC FEATURES

4. As shown on plate I, Genesee River originates in the Allegheny Mountains in northern Pennsylvania, whence it flows generally northward 158 miles, entering Lake Ontario at Rochester, New York. It brings to the lake runoff from 2,479 square miles, 96 of which are in Pennsylvania.

5. Although the nature of the Basin has been described in detail elsewhere in the Genesee Basin Comprehensive Survey Report, certain aspects will be described or related here because of their relevance to consideration of the status, conservation, use, and development of fish and wildlife resources.

6. The Basin lies within three distinct physiographic areas:

a. The highlands of Allegany, Cattaraugus, and Steuben Counties, New York, and Potter County, Pennsylvania;

b. A transitional escarpment zone in the counties of Wyoming, Ontario, and the southern half of Livingston County, New York; and

c. The lake plains lowlands in the counties of Ontario, Genesee, Monroe, and the northern half of Livingston County, New York.

7. Throughout the highland and lowland areas, generally speaking, the bed of the river is only slightly lower in elevation than the lands adjacent to its banks. Within the transitional zone, however, the escarpment has been deeply incised, as witness the deep canyon between Portageville and Mt. Morris on the main stem, through which the river passes over three major falls with an aggregate drop of 317 feet.

8. The main stem undergoes another sharp loss of elevation between the State Barge Canal and its mouth. In this reach through the City of Rochester, there is a series of falls and cataracts with an aggregate drop of 260 feet.

9. The transition zone, which on the main stem begins at Portageville and extends to Mount Morris, quite effectively separates Genesee Basin into two subbasins, in each of which are certain conditions affecting fish and wildlife resources. In the highlands of the upper or southern subbasin, tributary streams are relatively short and gradients steep. Waters are clear and cool. Some, however, have such restricted watersheds that they have intermittent or negligible flow during part of each year.

10. In the lower or northern subbasin, lying mainly in the lake plains lowlands, five major tributaries and several small ones enter the main stem. Proceeding downstream, the major tributaries include Canaseraga Creek, entering from the east at river mile 62 upstream from Lake Ontario; Conesus Creek from the east at mile 36; Honeoye Creek from the east at mile 26; Oatka Creek from the west at mile 22; and Black Creek from the west at mile 14 (there is another creek of this same name in the upper subbasin).

11. There are also four "Finger Lakes" in the lower subbasin, namely, Honeoye, Canadice, Hemlock, and Conesus. Honeoye and Conesus (see plate I) are located on the creeks bearing those names, respectively, while the outlet to Canadice is tributary to Hemlock Lake Outlet, which in turn flows into Honeoye Creek three miles downstream from Honeoye Lake.

NATURE AND IMPACT OF PREVIOUS DEVELOPMENTS

Mount Morris Dam and Reservoir

12. There have been a number of construction activities in Genesee Basin over the years which have had more or less impact on fish and wildlife resources. In recent times, the most important of these has been the operation of Mount Morris Dam and Reservoir project since its completion November, 1951, by the U. S. Army Corps of Engineers (see plate I).

13. This dam, located on Genesee River about two miles upstream from Mount Morris, New York, rises 210 feet above river bed elevation. At spillway crest, capacity is 337,000 acre-feet. The spillway is uncontrolled. Two penstocks were constructed in the left abutment to permit development of hydroelectric power but to date the project has been operated only as a flood-control facility, essentially dry-bed.

14. As such, it has effectively prevented most of the annual flooding which formerly occurred along the main stem downstream from Mount Morris. From a study of records prior to 1944, the Corps of Engineers found that flows in excess of 12,400 c.f.s. had caused flooding in the valley downstream from Mount Morris. Minor flood crests inundated practically as much of the flood plain as major ones, due to the exceedingly flat topography of the valley floor. Recession of flood waters after the peak was past was very slow. In order of decreasing frequency, inundation by flooding formerly occurred principally in March, April, February, May, and January.

15. With the combined characteristics of a very flat valley floor and practically annual flooding prior to construction of Mount Morris Dam, it was natural that the Genesee River should change its course from time to time, thus forming a great many oxbow lakes. These were rejuvenated each year by flood-waters. A few still remain.

Other Engineering Projects.

16. Other Federal projects, such as improvement of Rochester Harbor; clearing and snagging at Wellsville in Dyke Creek and Genesee River, from Groveland Station to the mouth of Canaseraga Creek, and in the vicinity of Nunda on Keshequa Creek; and some channelization and bank stabilization of Dyke Creek and Genesee River in the vicinity of Wellsville have been relatively unimportant insofar as impact on fish and wildlife resources is concerned.

17. State and local interests have also made improvements to meet specific needs in past years. In recent times these included;

a. Provision by the City of Rochester for passage of flood flows of about 55,000 c.f.s. through the city by constructing retaining walls, rebuilding dams, and deepening the river channel;

b. Construction of small dams at outlets to Hemlock and Canadice Lakes by the City of Rochester to provide additional city water supply and incidental flood control;

c. Construction of a dam at Rochester by the State of New York to maintain the pool level of the Barge Canal. The crest of this dam can be lowered 10 feet during flood periods.

d. Construction of a 25,000 acre-foot capacity storage reservoir (known as Canadea or Rushford Lake) on Canadea Creek near its mouth by Rochester Gas and Electric Corporation to augment low flows in Genesee River for hydroelectric power production. Flood control is a secondary and not a positive feature.

e. Construction of a dam on Wiscoy Creek by Rochester Gas and Electric Corporation for hydroelectric power production.

f. Improvement (from the standpoint of agriculture) of Canaseraga Creek and drainage of the valley, undertaken and maintained by Canaseraga Creek Improvement District from 1911 to 1918. Improvement consisted of straightening and deepening the creek and several of its tributaries. Drainage of the upper part of the valley between Groveland Station and Dansville was benefited but flooding was not eliminated.

Land-Use

18. Land-use within the 2,476 square miles of the Basin is 40 percent cropland, 15 percent pasture, 27 percent woodlands, 5 percent urban, and 13 percent miscellaneous (which includes the less than one percent of water area in lakes, ponds, and streams).[1/] Croplands and urban lands predominate in the lake plains lowlands; woodlands and pasture in the highlands. In 1964, according to the U. S. Department of Agriculture, 5,200 acres were irrigated and the major source of water was natural streamflow. Although the bulk of irrigated acreage is now in Monroe,

1/ U.S.D.A. Economic Research Service, Resource Development, Economic Division, March 1965.

Genesee, and Livingston Counties, there is said to be about 49,600 acres in small, scattered tracts in the northern subwatersheds which would lend themselves to irrigation.

Pollution

19. Due to lack of adequate treatment accompanying man's presence and enterprises in the Basin, water quality suffers from serious amounts of pollution in about 100 miles of stream, according to information furnished by the Federal Water Pollution Control Administration. These conditions are presently limited to the lower subbasin with the exception of Knight Creek, which enters Genesee River near Scio, New York. Streams principally affected are Oatka Creek downstream from Warsaw (4-5 miles of stream receiving municipal and industrial wastes); the downstream reaches of Honeoye Creek (3-4 miles polluted by creamery wastes in the vicinity of Honeoye Falls); and Genesee River in the vicinity of Avon (cannery wastes cause fish kills periodically). Pollution seriously reduces water quality also in the terminal 12 miles of Genesee River. Salt pollution has completely eliminated fish populations in Wolf Creek, as has oil pollution in Knight Creek downstream from Petrolia. The Basin is also characterized by repeated occurrence of accidental oil spills and contamination of waters resulting from improper use of insecticides and herbicides, both of which adversely affect fish and wildlife resources.

Drainage

20. From the standpoint of maintaining or improving fish and wildlife resources, continuing efforts to bring about dewatering of the Groveland Flats area is a matter of concern.

POPULATION

21. Over 70 percent of the people in the Basin live in the lake plains lowlands. From the standpoint of needs to be met by the fish and wildlife resources of Genesee Basin, however, we must consider not only the population within the Basin and its relation to the resources, but also within the "service area" which is considered to be (see plate II) the eleven counties covered by the "Genesee Basin Economic Base Study, Phase II" 1/ and the standard metropolitan statistical area of Buffalo 2/ which encompasses Erie and Niagara Counties, New York.

1/ New York State Conservation Department, Division of Water Resources, Population and Employment Projections 1970-2020, Genesee Basin Economic Base Study, Phase II, July 1965.

2/ Erie-Niagara Basin Regional Water Resources Planning and Development Board, Preliminary Population Projections for Cities, Towns, and Villages in the Erie-Niagara Basin, February 1965.

22. The 1960 population in the service area was 2,430,000; it is expected it will increase to 4,620,000 by 2020. Comparable figures for within the basin are 425,000 and 880,000, respectively. By 1980, assuming a straight line relationship, there would be 3,160,000 people living in the service area, of which 570,000 would be within Genesee Basin itself. Most of these people, more so even than at present, will reside in urban communities, will be engaged in manufacturing or service industries, and will seek outdoor recreational opportunities for leisure time activities.

RESOURCE CAPABILITY AND CURRENT USE

FISHERY RESOURCES

23. Fish and wildlife of most kinds common to northeastern United States are present in Genesee Basin and access to fish and wildlife habitat still is not severely restricted.

24. There are extensive lake-type fisheries in the lower subbasin although there is a definite lack of such habitat in the upper one. Six lakes — Honeoye, Hemlock, Canadice, Conesus, Silver, and Rushford (Caneadea) — range in size from 580 to 3,251 acres and in addition to panfish, contain most of the important warm-water game species, including the pikes, pike-perches, and basses. In addition, lake and rainbow trout are present in Hemlock, Canadice, and Rushford Lakes. (See table N-1 and plate I).

25. There are no access restrictions to fishing in Honeoye, Conesus, or Silver Lakes (Conesus is the most heavily used warm-water fishery in the Basin). A permit from the Rochester Water Department, however, is required to fish in Hemlock Lake. Rushford (Caneadea) Lake has no access restrictions on fishing, but Rochester Gas and Electric Company drops the water level about 35 feet after Labor Day.

26. Rockville Lake, on Black Creek, southwest of Belfast about four miles, has a maximum depth of about eight feet. It is not considered very good fishery habitat.

27. Cuba Lake, about 12 miles southwest of Belfast, lies just outside the Basin. It could conceivably serve to meet some of the Basin's needs, but due to unusual circumstances, private cottages practically surround it and public access is limited even though the lake itself is managed by the New York State's Allegany State Park Commission.

TABLE N-1 - Major lake fisheries - Genesee River Basin, New York

Name	Sub-Basin #	Surface area	Game fish present	Fisherman-days per surface acre 1964-65	Total fisherman-days use 1964-1965
Honeoye Lake	17	1,670 acres	Walleye, largemouth bass, smallmouth bass, yellow perch, chain pickerel and panfish.	44	73,500
Hemlock Lake	17	1,856 acres	Lake trout, rainbow trout, largemouth and smallmouth bass, chain pickerel, white fish and panfish.	7	13,000
Canadice Lake	17	621 acres	Lake trout, rainbow trout, largemouth bass, smallmouth bass, pickerel and panfish.	28	17,400
Conesus Lake	16	3,251 acres	Yellow perch, walleye, northern pike, largemouth and smallmouth bass.	25	81,300
Silver Lake	12	762 acres	Northern pike, walleye, yellow perch, largemouth bass and panfish.	127	96,800
Rushford (Caneadea) Lake	9	580 acres	Smallmouth bass, yellow perch, bullhead, black crappie and rainbow trout, lake trout.	30	17,400
Allen Lake	8	50 acres	Rainbow trout & brook trout.	50	2,500
Totals		8,790 acres			301,900

Note: Above data not based on latest information, but upon best available at time.

28. Allen Lake is a man-made body of water of about 50 acres and maximum depth of 16 feet. It was acquired by the New York State Conservation Department after being privately constructed and it is being improved and managed for trout fishing by the Division of Fish and Game. This is an effort to overcome the present lack of lake-type fisheries in the upper (southern) portion of the Basin.

29. Stream fisheries in the Basin are populated with both warm-water and cold-water species, according to the type of habitat available. Lake runs of silver bass, smallmouth bass, and walleyes ascend upriver a short distance from Lake Ontario. The Court Street Dam in Rochester, constructed by the State of New York to maintain water levels in the Barge Canal, backs water up to the mouth of Honeoye Creek (river mile 26) creating a float-fishing reach in which there is good fishing for bass, walleyes, and panfish.

30. From the mouth of Honeoye Creek to Belmont, Genesee River is a warm-water fishery varying considerably in quality in different stream segments. Other warm-water stream fisheries of note include Black Creek from Byron, New York, to its confluence with Genesee River near Rochester; Oatka Creek in the vicinity of Pavilion Center; and Honeoye Creek from Honeoye Lake to its confluence with Genesee River.

31. Oatka Creek in times long past was a famous trout stream. Although it has deteriorated a great deal in some reaches, it still is an attractive trout fishery in the vicinity of Mumford. The cool waters of Spring Creek which enter Oatka Creek at Mumford are largely responsible for maintaining good trout habitat conditions in the lower reaches. This is really a unique situation - having a fine trout fishery within 30 minutes drive from a city the size of Rochester.

32. The best quality trout streams in the Basin are probably Spring Creek at Caledonia, the Wiscoy, the East Koy, Mill Creek near Dansville, the 18 miles of Genesee River upstream from Belmont, and Cryder Creek in the vicinity of Whitesville, together with some good waters in the Pennsylvania portion.

WILDLIFE RESOURCES

33. Wildlife resources are quite abundant and varied. In the northern portion of the basin is some of the finest pheasant hunting in New York State, although hunting opportunities are limited somewhat by posting - a growing problem. The savannah-like pasture lands on the flood plain of the lower basin, characterized by great, open-grown, wide spreading

oak trees, are favored by squirrels. Historically, it was a gray squirrel population but, in recent years, fox squirrels have extended their range into this area. Ruffed grouse, gray squirrels, and woodcock are found throughout the forested areas, while forests in the upper (southern) portion of the Basin are also inhabited by wild turkeys. Varying hare occur in isolated pockets of habitat in the upper Basin area, while cottontail rabbits are found throughout the Basin. Big game animals include whitetail deer and black bear. Deer are abundant, but bear are scarce. Fur animals such as muskrat, mink, and beaver are plentiful, and so are many others not in such great demand, such as raccoons, red and grey foxes, skunks, and opossums.

34. Waterfowl historically used the flood plains of Genesee River and its major tributaries extensively during spring migration and to a lesser extent during fall migration and the nesting season. This use, especially by migrating geese, was to a great extent eliminated by construction and operation of the Mount Morris Dam and Reservoir flood control project. With flood control came encroachment on the flood plain by agriculture and by urban or industrial developments. Waterfowl habitat disappeared.

35. Now the most significant remnant is Groveland Flats. Here, during the season of spring floods, many thousands of ducks and Canada geese and a growing number of swans stop to feed and rest en route to their more northern nesting grounds. Such concentrations are sufficiently uncommon these days that this one draws thousands of interested observors to the Groveland Flats area each spring.

36. Resting areas for waterfowl migrating southward in the autumn and waterfowl hunting opportunities are in short supply. Conesus Lake is a concentration area for scaup, goldeneye, black ducks, and mallards in fall. Very fine wooded wetlands lie at the heads of both Conesus and Honeoye Lakes. In addition to providing good nesting habitat, particularly for wood ducks, and resting habitat for waterfowl during fall and spring migrations, the swamp at the head of Conesus Lake is the only extensive northern pike spawning area around that lake. Other extensive wooded swamps heavily used by waterfowl include the wetlands along Honeoye Creek and those along Canaseraga Creek from the northern limits of Groveland Flats to the Genesee River.

37. A few of the old oxbow lakes remain on the Genesee Basin flood plain downstream from Mount Morris. These are used during nesting season and offer good hunting opportunity in the fall. (They also furnish warm-water fishing opportunities).

38. Excellent but limited waterfowl hunting opportunities are provided also by the "set-backs" or coves along the main stem, formed during

periods of high water wherever the full force of the current is deflected against one bank or the other by a gravel bar.

39. One other area of particular value to waterfowl and for waterfowl hunting is that reach of Oatka Creek in the vicinity of Pavilion Center. Through that part of its course, the creek is 50 to 100 feet wide and vegetation consists primarily of pondweeds which provide excellent waterfowl food.

SUMMARY OF RESOURCES

40. In summary, the existing lakes and a considerable portion of the streams of the basin were providing satisfactory levels of fishing recreation to satisfy the 1964 fishing use, although not the total demand, as will be explained later. Total fishing pressure in 1964 and 1965 was estimated to be 362,000 man-days of fishing enjoyed by a total of 80,000 fishermen (table N-2). These figures are based upon field surveys of use. It is estimated that if access to all existing fishery resources in the basin was such that full use could be made of them, they would be capable of providing for sustained use at the rate of 670,000 man-days of fishing opportunity annually.

41. Total hunting pressure in 1964 was estimated to be 640,000 hunter-days in which 60,000 hunters participated (table N-3). Generally speaking any plans for development and use of the water resources of the Basin would appear to have little effect upon wildlife resources' capability for meeting needs, except in the case of waterfowl and fur animals. Again, with the exception of waterfowl, wildlife resources are considered adequate to meet present needs and those for the immediate future. Thus, except for waterfowl, no attempt will be made here to analyze the overall capability of the wildlife resources. (We shall, of course, be concerned with any losses which may occur as a result of the overall comprehensive plan).

42. The potential waterfowl hunting use, on the basis of data contained in the 1960 National Survey of Fishing and Hunting and other available information, would have amounted to 48,000 man-days in that year. This recreation would have been enjoyed by 9,600 hunters. These figures merely indicate potential use (a part of the latent hunting demand) based upon national average figures indicating that 1.5 percent of the total population over 12 years of age hunted waterfowl. It was also assumed that the number of days spent waterfowl hunting in the basin by these hunters would have averaged a conservative five days per hunter.

Table N-2 Estimated Fishing Use by Watersheds
Genesee Basin, New York. 1964-65

Watershed name, 1/ number, and % of total basin		Present use: fisherman-days			
		Stream fishing		Lake fishing	
		Trout	Warm-water	Trout	Warm-water
Genesee South #1	3.46%	1,000			
Cryder Creek #2	2.00%	500			
Genesee-Chenunda #3	3.30%	5,090			
Dyke Creek #4	2.90%	560			
Genesee-Vandermark #5	2.38%	3,600	175		
Van Campen Creek #6	2.38%		15		
Angelica Creek #7	3.42%	90	30		
Genesee-So. Black Cr. #8	3.54%		150	4,000	
Caneadea Creek #9	2.52%	30	30	17,400	
Genesee-Cold Creek #10	5.03%		300		
Wiscoy Creek #11	4.45%	22,640	100		
Silver Lake #12	4.66%		400		96,800
Canaseraga Creek #13	13.47%	2,300	400		
Beards Creek #14	2.0%				
Genesee-Geneseo #15	6.48%		1,000		
Conesus Lake #16	3.6%		300		81,300
Honeoye Creek #17	10.9%	1,950	550	30,400	73,500
Oatka Creek #18	8.72%	15,300	250		
Black Creek #19	8.6%	200	900		
Genesee-Rochester #20	2.6%		600		
Sub-totals		53,260	5,200	51,800	251,600
Totals			361,860		

1/ SCS watershed breakdown, Figure 38 in Summary Report and plate J-4 in Appendix J, - Volume 6.

Table N-3 Estimated Hunting Use by Watersheds
Genesee Basin, New York, 1964

Watershed name, number and % of total basin		Present use: hunter days			
		Big game	Small game		Other
			Birds	Mammals	
Genesee South #1	3.46%	7,000	2,000	4,000	1,500
Cryder Creek #2	2.00%	6,955	1,950	3,640	1,300
Genesee-Chenunda #3	3.30%	11,235	3,150	5,880	2,100
Dyke Creek #4	2.90%	10,058	2,820	5,264	1,880
Genesee-Vandermark #5	2.38%	20,094	5,640	10,528	3,760
VanCampen Creek #6	2.38%	8,560	2,400	4,480	1,600
Angelica Creek #7	3.42%	11,770	3,300	6,160	2,200
Genesee-So. Black Creek #8	3.54%	12,198	3,420	6,384	2,280
Caneadea Creek #9	2.52%	8,774	2,460	4,592	1,640
Genesee-Cold Creek #10	5.03%	17,441	4,890	9,128	3,260
Wiscoy Creek #11	4.45%	6,000	8,000	11,000	7,200
Silver Lake #12	4.66%	4,050	9,500	14,600	8,400
Canaseraga Creek #13 (Groveland Flats)	13.47%	18,000	6,420 11,000*	36,500	6,420
Beards Creek #14	2.0%	2,250	3,840	5,200	3,800
Genesee-Geneseo #15	6.48%	3,360	16,700	16,750	14,100
Conesus Lake #16	3.6%	2,025	9,860	8,550	9,860
Honeoye Creek #17	10.9%	18,050	17,525	14,000	15,000
Oatka Creek #18	8.72%	4,860	7,750	3,250	5,400
Black Creek #19	8.6%	1,085	25,250	13,000	25,000
Genesee-Rochester #20	2.6%		7,100	3,500	7,000
Sub-totals		173,765	154,975	186,406	123,700
Totals		638,846			

* Bird-watching

43. It is obvious, however, that the present extent of the waterfowl resource does not provide sufficient waterfowl hunting opportunity to attract this magnitude of use. For example, in the Groveland Flats area, where waterfowl resources and use were studied in detail, direct use of the area for hunting at present is estimated to be 1,000 man-days annually. The Flats also exert a small amount of holding influence on the flocks migrating through in the fall, so that hunting opportunities are improved throughout the adjacent area. As a result of this, it is estimated 1,500 additional hunting days are provided. In other words, one of the best, if not the best, fall waterfowl areas presently provides only 2,500 man-days of hunting, annually.

NEEDS RELATED TO FISH AND WILDLIFE RESOURCES

NEEDS ACCOMPANYING DEVELOPMENT

44. When the Genesee Basin was being settled, fish and wildlife resources provided a major source of food and income for the pioneers. Development of agriculture caused the importance of these resources as a source of food to dwindle, although it has never disappeared entirely. Development of industry reduced the significance of fish and wildlife resources as a source of income almost to zero.

45. As populations increased, however, and living under urban rather than rural conditions became predominant, fish and wildlife resources have again come to have a very significant part in providing a source of income. This is largely the result of another significant need which has become very important in the lives of our people, most of whom now live, and work, in and around large cities. That is the need for outdoor recreation. The demand for recreational opportunities related to fish and wildlife resources has grown rapidly in recent years in keeping with (but faster than) population growth, increased personal incomes, more leisure time, and improved travel facilities.

46. As stated in the description of the Basin, its population in 1960 was 425,000 people and that of the service area, as defined, was 2,430,000. By 1980 we can expect these figures to have increased to 570,000 and 3,160,000 and by the year 2020, they will have become 880,000 and 4,620,000, respectively.

47. In this report, the present and projected numbers of hunters and fishermen are based upon the above population figures, field surveys of actual use, and data from the 1960 National Survey of Fishing and Hunting[1/]. That publication provides information only for the portion

1/ Circular 120, Bureau of Sport Fisheries and Wildlife, Fish and Wildlife Service, U. S. Dept. of the Interior

of the population 12 years of age and older. In terms of service-area populations, then, we are talking about hunters and fishermen within a population of 1.8 million people in 1960, 2.4 million in 1980, and 3.6 million in 2020. Within the Basin, comparable figures would be 320,000 for 1960, 430,000 for 1980, and 690,000 for 2020.

PRESENT AND POTENTIAL FUTURE DEMAND UPON FISHERIES

48. The total number of fishermen within the Basin's service area, exclusive of those under 12 years of age, amounted to 215,000 in 1960. Each fished, on the average, 18 days during the season.

49. From field surveys, it was determined that fishing use of the Basin's lakes and streams, in round numbers, amounted to 370,000 man-days in 1964, as mentioned previously in paragraph 40. This use was attributable to 80,000 fishermen who spent an average of five days, each, fishing in the Basin. Of their number, about 50 percent came from the Buffalo Metropolitan area. Table N-2 presents 1964 fishing use of all lakes and streams, both warm-water and trout fisheries, in each subbasin. Use figures from table N-1 are incorporated in table N-2.

50. Present annual usage, however, does not truly reflect the demand to be expected from populations within the Basin and its service area. Even the 80,000 fishermen in 1964 spent only about ¼ of their collective annual number of fishing days on the Basin's waters. There are undoubtedly other persons, particularly among residents of Rochester and Buffalo, who would like to fish and who would be attracted to the Genesee Basin to do so if the quantity, quality, availability, etc., of the resources were improved. In other words, there is a latent demand for fishing opportunity. On the basis of available data, the latent demand within the Basin and its service area amounts to an additional 40,000 potential fishermen.

51. In projecting estimated fishing demand, good planning dictates that this latent demand be recognized as well as the anticipated increase in numbers of participating fishermen and the amount of time available for fishing recreation. The logic of this, admittedly, may be somewhat difficult to follow, since obviously, unless resource conditions improve sufficiently, there will be no increase in active participation.

52. We do, in fact, estimate future active participation by beginning with the relationship of present use to present population. Future use becomes a function of future population estimates, modified by foreseeable trends in work hours, personal income, travel facilities, living habits, etc.

We assume that if we can provide an abundance and quality of resources to satisfy future needs commensurate with what is necessary to satisfy present users, the percentage of the population using those resources will remain constant except as it may be affected by the trend factors mentioned.

53. In recognizing the latent demand, which was shown to exist by the studies of the Outdoor Recreational Resources Review Commission, we must go a step further in our planning concept and accept the fact that, insofar as possible, latent demand should be converted to active participation by improving the fisheries and fishing access and other facilities to the extent that all who wished to do so could find attractive and satisfying sport fishing opportunities within their reach.

54. The goals of planning to meet needs related to fish and wildlife resources, therefore, should be to provide for an increase in the percentage levels of population participation through activating the latent demand as well as satisfying the constant increase in active participation. We contemplate that this would be done on a gradual basis. In other words, by 1980, the total number of fishermen that the basin waters would be expected to serve would amount to 136,000, of which 30,000 would have been drawn from the latent demand group. By 2020, the objective should be to convert the entire latent demand, estimated to be 90,000 potential fishermen, to become a part of the total active fishermen group, 250,000.

55. In projecting man-days of fishing-use it was assumed that development of the fishery resources would have as its goal, also, the attainment of such quantities and qualities of fishing opportunities as would encourage users from within the Basin to spend at least 18 fishing-days there, annually, and for those who come from the Buffalo area to spend at least 10 fishing-days in the Genesee Basin. By 1980, therefore, fisheries of the Basin should be sufficiently abundant and attractive as to sustain 2,060,000 man-days, annually, and by 2020, 3,900,000 man-days.

PRESENT AND POTENTIAL FUTURE DEMAND UPON WILDLIFE

56. Applying data from the 1960 National Survey of Hunting and Fishing to the figures referenced previously in paragraphs 46 and 47, the total number of hunters within the service area was determined to be 160,000. The number of days spent hunting averaged 13 per man.

57. Available data indicates that 60,000 people hunted within the Basin in 1960, benefiting from a total of 640,000 hunter-days of recreation (see table N-3). As in the case of fishing, there is a latent demand for hunting, and this, in 1960, amounted to an estimated 25,000 man-days in the Basin.

58. Adhering to the same logic and procedures used in the case of fisheries, our planning for the improvement of wildlife resources should endeavor to create hunting conditions which would not only meet needs of a proportionate increase in active hunters, but also convert those in the latent demand group to active participation. Again, we visualize this activation as a gradual process, which, hopefully, would be accomplished by 2020.

59. With this in mind, we would anticipate 98,000 hunters in the Basin by 1980, of which 20,000 would have been drawn out of the latent demand group. By 2020, what might have otherwise developed as a latent demand group of 60,000 persons should have been activated by improved conditions so that they, together with the projected increase normally expected in the number of active participants, will constitute a total of 177,000 desiring to hunt in Genesee Basin.

60. As in the case of fishermen, about 50 percent of all hunters using the Basin came from the Buffalo area, but unlike the fishermen, hunters were inclined to spend all their available hunting time in the basin. This averaged, as previously stated, 13 days per man annually. The number of hunter-days anticipated in the Basin by 1980, therefore, is 1.3 million, while by 2020 recreational hunting use could reach a level of 2.3 million man-days a year.

61. While the foregoing figures are generally of less importance to planning for water and related land resources in Genesee Basin than the comparable figures on fishing use, they are of significance from the standpoint of rounding out the analysis of the total recreational and economic importance of the fish and wildlife resources of the Basin. It is important to planning, however, that we carry our analysis of waterfowl hunting demand a step further.

62. According to the 1960 National Survey of Fishing and Hunting, we could expect that 1.5 percent of the total basin and service area populations over 12 years of age would have been active participants in the sport of waterfowl hunting. Using this same percentage, we could expect to have 6,450 active waterfowl hunters within the Basin by 1980 and 10,350 by 2020. Comparable figures for the service area would be 36,000 and 54,000, respectively. These are all to be considered active participants in the sport and presumably those within the Basin would do their hunting there if the opportunity were provided. An equal number could be expected to come into the Basin from other portions of the service area if the resources were adequate to satisfy these additional needs.

63. The above figures do not take into account the conversion of latent demand to active participation. If this were accomplished as outlined in paragraphs 58 and 59, 3,000 participants would be added to the active list by 1980 and 7,000 by 2020, making the total number of hunters desiring to hunt waterfowl in the Basin 16,000 and 28,000, respectively, in those years.

64. Assuming a very conservative five days of waterfowl hunting in the Basin per year per man, these figures represent 65,000 waterfowl hunting recreation days in 1980 and 140,000 in 2020.

SUMMARY OF NEEDS

65. In summary, the needs related to fish and wildlife resources for the years 1980 and 2020 are estimated to be as shown in the following tabulation:

Year	All Fishermen		All Hunters		Waterfowl Hunters	
	No. of Persons	Use in Man-Days	No. of Persons	Use in Man-Days	No. of Persons	Use in Man-Days
1980	136,000	2,060,000	98,000	1,300,000	16,000	65,000
2020	250,000	3,900,000	177,000	2,300,000	28,000	140,000

66. These represent the goals we are attempting to reach in planning the conservation and development of fish and wildlife resources in Genesee Basin to satisfy anticipated future demand.

ECONOMIC IMPACT OF DEMAND

67. As we indicated back in paragraph 45, the development of need or demand for outdoor recreational opportunities in recent years has been phenomenal. All studies have shown there must be maximum development of fish and wildlife resources in each basin or parts of a basin where this is possible if we are to keep abreast of the growing demand for recreational opportunities related to such resources. This, as we have said, is one major objective in planning.

68. There is a second major objective, however, which is equally valid - that is, to improve the economic opportunities and general welfare of the people of the Basin - to create more business opportunities, more jobs, higher levels of personal income, etc. In the following discussion we will consider the magnitude of the impact which could be brought to bear upon the economy of the Basin if fish and wildlife resources <u>were</u> conserved and developed to meet the projected needs shown in foregoing paragraphs and if there was sufficient investment made in advertising

and accommodations to bring the maximum numbers of hunters and fishermen consistent with the resource capabilities into the resource areas and hold them there as long as their individual amounts of leisure time allow.

69. The needs, demand, desires - call them what you will - of a large percentage of the American people for recreation related to fish and wildlife resources generates a considerable demand for goods and services which in turn has considerable impact upon the economy of (1) the localities whence these people come, (2) the areas to which they go for recreation, and (3) the areas through which they travel from one to another of these places. The amount of the total economc impact which may occur in any one of these three localities will be governed to a large degree by factors of distance, duration of trip, facilities provided, amount and success of advertising activity, etc.

70. It bears repeating that to the extent hunters, fishermen, and others seeking outdoor recreation and drawn to a given area by the fish and wildlife resources can be induced to obtain the goods and services they require in that area and to spend the major portion of their leisure time in that area - to that extent will the area's economic welfare be enhanced. This is a particularly important way of distributing urban wealth to rural areas.

71. The figures given in the subsequent paragraphs have been developed from the foregoing hunter and fisherman demand estimates and from data provided by the 1960 National Survey of Hunting and Fishing. An itemized breakdown of annual expenditures of fresh-water fishermen in 1960 is given in table N-4 and for those of hunters in table N-5.

72. In estimating total expenditures of hunters and fishermen in the Genesee Basin in 1960, however, certain judgment factors were applied. In the first place, it was known that those who fished the Basin's waters did so on the average only five days out of an average annual 18 days of fishing. Fishermen who resided in the Basin, therefore, were assumed to have spent roughly a third of their annual outlay for fishing in the Basin. Those fishermen who came from the Buffalo area, however, were assumed to have spent within the Basin only 17.5 percent of their total annual fishing expenditures. On this basis, the 80,000 fishermen who used the fisheries of Genesee Basin in 1960 spent a total of $1.9 million in the Basin.

73. As in the case of fishermen, about 50 percent of all hunters using the Basin's resources came from the Buffalo area. Hunters, however, were inclined to spend the majority of their available annual hunting time (13 days on the average) in the Basin. Hunters from outside the Basin

Table N-4 - Average annual expenditure per fresh-water fisherman 1960 [1/]

Items	$ Expended	%
Food and lodging:		
Food	7.01	7.4
Lodging	2.28	2.4
Transportation:		
Automobile	13.91	14.6
Bus, rail, air, and water	.06	-
Auxiliary equipment:		
Boats and motors	26.97	28.3
General	9.99	10.5
Fishing equipment	10.81	11.4
Licenses, tags, and permits	2.27	2.4
Privilege fees and other:		
Annual lease and privilege fees	.39	.4
Daily entrance and privilege fees	1.44	1.5
Bait, guide fees, and other trip expenses	18.01	18.9
Boat launching fees	.45	.5
Other	1.66	1.7
Total	$95.25	100 %

Table N-5 - Average annual expenditure per hunter 1960 [1/]

Items	$ Expended	%
Food and lodging:		
Food	5.35	6.7
Lodging	1.87	2.4
Transportation:		
Automobile	10.93	13.8
Bus, rail, air, and water	.57	.7
Auxiliary equipment:		
Boats and boat motors	8.30	10.5
General	6.53	8.2
Hunting equipment	24.29	30.6
Licenses, tags, and permits:		
Licenses, tags, and permits	3.97	5.0
Duck stamps	.31	.4
Privilege fees and other:		
Annual lease and privilege fees	.72	.9
Daily entrance and privilege fees I [2/]	.48	.6
Daily entrance and privilege fees II [3/]	.55	.7
Guide fees, and other trip expenses	2.53	3.2
Dogs	10.86	13.7
Other	2.08	2.6
Total	$79.34	100 %

1/ Persons 12 years old or older; nationwide average.
2/ Daily fees for hunting on commercially operated preserves.
3/ Daily fees for hunting on wild lands.

boundaries were assumed to spend 63 percent of their average annual outlay for hunting within the Basin. Applying these factors, the 1960 impact of hunter expenditures on gross sales of goods and services in the basin was estimated to be $3.9 million.

74. As previously explained in connection with demand, there is at present a latent demand for both hunting and fishing opportunities and projections were based upon gradual absorption of this latent demand into the ranks of active participants, with the goal of fully accomplishing this by the year 2020. Accomplishment of this objective would be the result of improving habitat carrying capacity, creating additional habitat, and by all means possible increasing hunting and fishing opportunities. In projecting the economic impact of hunting and fishing use in the Basin, it has been assumed:

a. That there will be an increase in the quantity and quality of fisheries in the basin sufficient to induce users to spend more and more of their available fishing time in the Basin, and therefore,

b. That the percentage of the annual outlay for fishing which will be expended in the Basin by non-residents as well as residents will increase; and

c. That the percentage of available time and cash expenditures in the Basin by hunters will remain essentially the same in relation to total annual expenditures by this group.

75. On the basis of the foregoing assumptions, estimated expenditures of fishermen and hunters in the Basin will amount to $6 million and $7.6 million, respectively, in the year 1980; by the year 2020, comparable figures will have reached a level of $20.6 million and $12.1 million. These amounts, we must emphasize, are only potentials, but they are potentials which could become realities through adequate conservation and development of fish and wildlife resources. The figures are in terms of dollar values and prices as of 1960.

76. To the reader who is interested, there it is - a market for goods and services which was in the magnitude of $5.8 million in 1960 and which can reasonably be expected to reach a level of $13.6 million annually by 1980 and $32.7 million by the year 2020. The extent to which the impact of this potential market will affect the welfare of Genesee Basin rests largely with the people of the Basin and the effort they are willing to put forth to get it. It will take vision and determination as well as hard work. Assistance from the State and Federal Governments will also be necessary. Otherwise, although there is no doubt that the market will still develop, its influence and economic impact will largely benefit places other than the fish and wildlife resource areas of the Genesee Basin.

FISH AND WILDLIFE PROBLEMS AND POSSIBLE SOLUTIONS

INTRODUCTION

77. The road to greater abundance of fish and wildlife resources to meet future demands for recreation and assure maximum economic benefit to the Basin is beset with many problems. These problems will be compounded by an increase in human population which almost inevitably tends to erode the resource base through alteration and/or destruction of fish and wildlife habitat. While changes in land-use and water-use patterns affecting fish and wildlife are inevitable, the direction and degree of change can be greatly influenced by concerted efforts of planning agencies at the Federal, State, and local levels and, especially, a determination at local and State levels to realize to the fullest extent the benefits which can be obtained through carefully conserving and developing their fish and wildlife resources.

78. Fish and wildlife areas of significance in planning for development of water and related land resources are shown on plate I.

FISHERY PROBLEMS AND POSSIBLE SOLUTIONS

General Discussion

79. Providing adequate fishing opportunities (including adequate fish populations) to satisfy future demands will be difficult. There are about 14,200 surface acres of water in the Basin: 8,800 acres in seven major lakes and 5,400 acres in 570 miles of streams. In 1960, this represented about 0.18 acres per fisherman. By the year 1980, the same number of acres, in relation to anticipated demand, will represent only 0.10 acres per fisherman and by 2020, only 0.06. Some of the Basin's waters, furthermore, are either closed to fishing or are failing to support fishing use to the fullest extent possible because they are water-supply reservoirs, or are posted, or polluted, etc. Even, however, assuming that some day these waters too will be open to fishing and capable of providing fairly satisfactory levels of fishing success, there will still be need for a greatly increased acreage of aquatic habitat to satisfy future fishing demand.

80. Actually, even today the lakes and streams of the Basin can not be said to meet present needs. It is true that fishermen, to the extent they presently use the Basin's waters, find fishing opportunity of quite satisfactory quality. It must be remembered, however, that these fishermen do not find fishing opportunities attractive enough to induce them to spend more than about five out of the average 18 days they fish each year in fishing Genesee Basin waters.

81. A number of major problems must be solved in order to insofar as possible satisfy present and future needs for fishing opportunity. These problems are created by lack of public access, pollution, periods of low water, periods of high water (floods), irrigation, and insufficient fishery habitat.

Public Access

82. Public access presents a problem of increasing magnitude throughout the Basin. Few lakes or streams are entirely free from "No Trespass" signs. Many miles of stream banks are posted by individuals and clubs to reserve choice fishing areas and prevent trespass by the general public. Segments of Rush, Cryder, Dyke, and Oatka Creeks and the headwater reaches of Genesee River are posted against trespass, effectively preventing full use of the fishery resources.

83. Fishing on Hemlock Lake is allowed but, as mentioned in the description of the Basin, only by permit from the City of Rochester. On Rushford, Honeoye, Conesus, and Silver Lakes, peripheral developments are expanding rapidly, tending to restrict public access. In addition, shoreline development resulting in filling-in shoal areas destroys natural fish spawning and rearing habitat, thus reducing the lake's productive capacity. Such developments along the shore lines, coupled with a growing amount of water-oriented general recreation, will conflict increasingly with fishing unless zoning regulations are adopted which will promote satisfactory multiple-use conditions and be compatible with maintenance of maximum productivity and full use of the fishery resources.

84. Each of the Basin states has an active program for acquisition and development to make fishing waters available for public use. Lake and stream frontage, however, is rapidly becoming such expensive real estate that future acquisition for this purpose may be greatly curtailed. It becomes urgent, therefore, that acquisition programs be accelerated if public access for fishing is to be assured for the future.

Pollution

85. The Genesee River and several of its tributary streams are polluted, as previously stated. The pollution results from a wide variety of industrial, municipal, and domestic wastes. About 100 miles, as previously mentioned in the description of the Basin, are polluted to a degree that adversely affects fish or fishing. Fishermen are usually reluctant to fish in waters known to be polluted. Pollution effects are accentuated during periods of low flows.

86. Pollution, as previously mentioned, has eliminated fishery resources from Knight and Wolf Creeks and the lower reaches of Honeoye Creek. Oil, salt, and domestic pollution, respectively, affect these streams. The lower 12 miles of Genesee River, also mentioned previously, carries a variety of pollutants which severely curtails its ability to support a fishery and its desirability for fishing use. This stream segment is located in the City of Rochester where there is undoubtedly a large latent demand for fishing opportunity. Many other streams are subjected to seasonal pollution from small vegetable-canneries, creameries, and barnyards.

87. The naturally fertile lakes of the Basin receive large amounts of nutrient-rich runoff from agricultural lands which encourage growth of aquatic vegetation. Although to date this has not become a significant factor affecting fisheries, in time this additional stimulation of plant growth can be expected to impede fish production and even result in development of undesirable fish populations. A matter of particular concern is the seepage which presently enters Honeoye and Conesus Lakes from sanitary facilities constructed in connection with developments along the lake shores.

88. The Water Quality Act of 1965 (Public Law 89-234) and the recent anti-pollution law passed by the State of New York, coupled with the growing public demand for and administrative emphasis on clean waters, has given impetus to the development of pollution abatement programs which are expected to reduce the detrimental effects of pollution on fisheries in the Basin before long. Pollution abatement would be a significant contribution to gaining greater fishing opportunities from existing streams.

Low Flows and Floods

89. Extreme variation from periods of very high to periods of very low flow is the characteristic hydrologic pattern common to most streams in the Basin. East Koy, Wiscoy, Dyke, and Cryder Creeks and the upper reaches of the main stem of Genesee River present particularly serious problems in this regard. Too much water during spring run-off period and the summer "cloud-burst" season causes bank erosion, bottom scouring, and a pool-to-riffle ratio not conducive to maximum fish production and survival. The spring period of high discharge is adverse also in that it causes a reduction in the quality of fishing opportunity coincidental with the period of peak fishing demand on the streams. Conversely, by late summer the flow in many streams has dropped to only a fraction of the early summer flows and fishing again is severely curtailed. Facilities constructed for flood control and storage for other purposes, including low-flow augmentation, could alleviate these streamflow problems.

90. Another effect of flood flow reduction will be the facilitation of projects designed to improve fish habitat through bank stabilization, fencing, erosion control, and development of better pool-to-riffle ratios. These improvements would be carried out by the respective state fish and game agencies.

91. Low-flow augmentation would greatly benefit stream fisheries. Satisfactory quality stream-fishing conditions could be extended through and beyond the critical late summer period and improved survival of fish populations could be assured. Coupled with stream improvement work, low-flow augmentation where applicable could more than double current stream-fishing opportunities. For list of streams and reservoir sites offering improvement possibilities, see attachment "B".

Irrigation

92. Irrigation is a growing threat to fishery resources of the Basin. East Koy and Springwater Creeks are two examples of good trout streams whose value is greatly reduced from this cause. Pumping water for irrigation from the streams during critically low periods reduces fishing opportunity and lessens chances for fish survival. The problem could be resolved through storage of water for low-flow augmentation for both fishery and irrigation use.

Lack of Habitat

93. The problems and possible solutions discussed in the preceding paragraphs had to do with existing water areas in streams and lakes. While these in themselves are very important considerations, there must be additional fishery habitat created if future needs are to be met. It is quite obvious that this additional habitat would have to be in the form of lakes. Data for 13 sites, developed by the Corps of Engineers, were studied with respect to fishery development. These sites are listed in table N-6, together with very preliminary data reflecting optimum reservoir size, allowable drawdown, whether or not there would be a multi-level outlet, minimum instantaneous release, potential fishing use and value, and certain special conditions suggested to maximize fishery benefits.

94. The data, the criteria, and the values shown in table N-6 cannot be considered firm; they merely serve to indicate that here are 13 possible solutions to the problem of insufficient fishery habitat, each capable of producing more or less additional fishing opportunity which in the aggregate is estimated to amount to about 1,140,000 man-days, with a total net recreational value amounting to $6,100,000, annually.

95. This Bureau, in cooperation with the New York Division of Fish and Game, also selected 22 smaller reservoirs for fishery development after studying data developed by the Soil Conservation Service for 226 sites. These sites are listed in table N-7 in order of desired construction priority. Information of preliminary nature is provided as to reservoir size and potential fishing use and recreational value. (Those with wildlife value are included in table N-7, also).

96. These 22 sites are possible solutions to the problem of insufficient fishery habitat, similar to the 13 larger reservoirs presented by the Corps of Engineers for study. A preliminary analysis indicates that they would add about 4,100 surface acres of fishery habitat and would provide for potential use to the extent of 360,000 man-days of fishing opportunity, with a related net recreational value in the amount of $1.9 million, annually. Other sites offering fishery values but not considered as having as high a priority for construction from a fishery viewpoint are listed in attachment "B".

97. Fishery values shown in tables N-6 and N-7 for Corps of Engineers and Soil Conservation Service reservoir sites are referred to as "net" recreational values. They are net only in the sense of having been derived from certain unit values prescribed as the net worth of a recreational day by Supplement No. 1, dated June 4, 1964, to Policies, Standards, and Procedures in the Formulation Evaluation and Review of Plans for Use and Development of Water and Related Land Resources, published as Senate Document No. 97, 87th Congress, Second Session, May 29, 1962.

98. In another sense they are maximum potential values, however, based in part upon the following assumptions: (1) that adequate public access will be provided consisting of at least one boat launching ramp and associated parking area for each 300 surface acres of water (at least one, also, if the impoundment is less than 300 acres in size); (2) that reservoir clearing plans will be coordinated with the appropriate state fish and game agency and this Bureau; (3) that reservoir zoning regulations will be adopted which will prevent loss of fishing opportunity due to competition of other water-oriented activities; (4) that reservoir operation will not unduly interfere with maintenance of a productive fishery and its maximum use; and (5) that the fish and game agencies of the respective states are given such responsibility and authority for control of fisheries habitat as is necessary for adequate management and development of the fishery resources. (The last provision applies equally to wildlife resources).

TABLE N-6 - Reservoir sites, Corps of Engineers, Genesee Basin, New York
pertinent engineering data and projected use
and value

Site name and number	Cons. Pool surface elev.	Cons. Pool surface acres	Maximum draw-down elev.	Multi-level outlet	Minimum Instant release in cfs	Type of Habitat in Res.	Annual Fisherman use Man-day potential Without Project	Annual Fisherman use Man-day potential With Project	Average Annual Potential value Without Project	Average Annual Potential value With Project	Special Conditions
Stannard on Genesee River #1	1590	1510	1570	yes	stream flow	Trout	8,000	150,000	$32,000	$600,000	Maximum drawdown limited to 5 feet from April 1 to November 1.
Chenunda Creek #2	1668	330	1638	yes	10	Warm-water	300	26,000	900	78,000	Temp. of tailwaters to be coordinated with New York Conservation Department.
Vandermark Creek #3	1674	320	1644	yes	10	Warm-water	none	25,000	-	75,000	Temp. of tailwaters to be coordinated with New York Conservation Department.
Angelica Creek Site II 2 #4	1593	900	1583	yes	stream flow	Warm-water	300	72,000	900	216,000	Maximum drawdown limited to 5 feet from April 1 to November 1. Waterfowl hunter-days 300; Value $1,800.
Summit on Black Creek #5 1/	1695	1180	1685	N.A.	stream flow	Warm-water	200	94,000	600	282,000	Maximum drawdown limited to 5 feet from April 1 to November 1.
Belfast on Genesee River #6	1336	2000	1316	N.A.	stream flow	Warm-water	1,000	160,000	3,000	480,000	Drawdown only after October 1. Barrier dam at Belmont must be reconstructed.
Cold Creek #7	1360	325	1340	yes	10	Warm-water	none	26,000	-	78,000	Temp. of tailwaters to be coordinated with New York Conservation Department.
Rush Creek #8	1384	400	1354	yes	10	Warm-water	none	32,000	-	96,000	Temp. of tailwaters to be coordinated with New York Conservation Department.
Wiscoy Creek #9	1338	240	1300	yes	10	Trout	7,000	24,000	28,000	96,000	Barrier dams above flood pool on East Koy and Wiscoy Creeks must be constructed.
Portage on Genesee River #10	1160	4100	1120	N.A.	?	Warm-water	400	400,000	1,600	200,000	Special reservoir zoning and access must be provided for fishermen.
Keshequa Creek #11	784	560	744	yes	10	Trout	none	66,000	-	264,000	Temp. of tailwaters to be coordinated with New York Conservation Department.
Poag's Hole #12	938	380	840	yes	10	Trout	400	38,000	1,600	200,000	Temp. of tailwaters to be coordinated with New York Conservation Department.
Honeoye Creek #13	Not considered on advice of Corps of Engineers										
Oatka Creek #14	684	640	664	yes	30	Warm-water	10,000	51,000	30,000	153,000	Downstream water release, amount and temp., must be coordinated with New York Conservation Department.

1/ Essentially the same site as SCS Site #7-2

TABLE N-7 Preferential Listing of SCS Sites as Possible Solutions to Lack of Opportunities for Fish and Waterfowl Hunting.

NYSCD Region	Site No.	Location	Surface Acres	Order of Desirability	Type of Fishery	Fishing-Use Potential Man-Days	Fishing-Use Potential An. $Value	Waterfowl Hunting-Potential Man-Days	Waterfowl Hunting-Potential An $Value
One	17-1	Canadice Inlet	202	1	Trout	20,800	$ 83,200		
"	17-7	Mill Creek	124	2	"	12,400	49,600		
"	13-10	Two-Mile Creek	75	3	"	7,500	30,000		
"	11-4	East Koy Creek	92	4	"	9,200	36,800		
"	13-11	Newville Creek	57	5	"	5,700	22,800		
"	13-22	Sugar Creek	94	6	"	9,400	37,600		
"	13-24	Bradner Creek	50	7	"	5,000	20,000		
"	14-4	Beards Creek	90	8	"	9,000	36,000		
"	14-5	" "	90	9	"	9,000	36,000		
"	13-1	Trib-Canaseraga Cr.	60	10	"	6,000	24,000		
"	13-6 1/	Sugar Creek	243	11	"	19,400	58,200		
"	11-2	East Koy Creek	335	12	"	27,600	110,400		
"	13-5	Canaseraga Creek	210	13	"	16,100	64,400		
"	17-8	Trib.-Honeoye Outlet	215	1	Warmwater	17,200	$ 51,600		
"	18-2	Relyea Creek	105	2	"	10,100	30,300		
"	17-24	Gates Creek	258	3.	"	20,600	61,800		
"	17-19	Spring Creek	392	4	"	24,000	72,000		
"	19-7	Bigelow Creek	155	5	"	9,500	28,500		
"	17-12	Gates (Bebee) Crk.	500	6	"	30,000	90,000	600	$ 3,600
"	14-2	Pearl Creek	280	1 2/				280	1,700
"	15-2	Jaycox Creek	720	2				720	4,400
"	17-5	Honeoye Inlet	1,100	3				1,100	6,700
"	17-11	Gates Creek	109	4				109	700
"	18-5	Oatka Creek	138	5				138	800
Two	8-13	Wigwam Creek	227	1	Trout	22,700	$ 90,800		
"	5-21	Brimmer Creek	86	2	"	8,600	34,400		
"	10-3	Rush Creek	122	3	"	12,200	48,800		
"	3-1	Chenunda Creek	216	4	"	21,600	86,400		
"	9-3 1/	Caneadea Creek	72	5	"	5,800	17,400		
"	7-2 3/	Black Creek	1,180	1	Warmwater	94,000	$282,000	1,500	$ 9,000
"	7-1	Baker Creek	127	2	"	11,200	33,600	127	800
"	3-4	Marsh Creek	156	3	"	12,500	37,500	156	900

Note: Amount of use and value for both fisheries and waterfowl in this table are preliminary and incomplete - serving only to indicate the general level of usefulness in meeting needs.

1/ May be either a trout or warmwater fishery
2/ All in this group would serve a high priority need.
3/ Essentially same site as CE No. 5

WILDLIFE PROBLEMS AND POSSIBLE SOLUTIONS

General Discussion

99. Providing adequate populations of wildlife and opportunities to satisfy hunting and other future recreational demands related to wildlife will also be difficult. As a very rough rule-of-thumb, it may be said that it takes 10 acres of productive wildlife habitat to support one man-year of hunting in Genesee Basin. Making no allowance for lands unproductive of wildlife, the gross area of the basin, 1,570,000 acres, represented 26 acres per hunter in 1960. By 1980, that ratio will be 16 to 1 and by 2020, only 9 to 1. This rough appraisal indicates the trend which will occur unless means and measures are taken to modify it.

100. In the case of fisheries, more aquatic habitat can be created (usually, of course, with some accompanying loss of wildlife habitat areas). There is little opportunity, however, to create more wildlife habitat, except in the case of waterfowl and fur animals. For meeting future needs for upland-game species, we must rely largely upon bringing every available acre of habitat to its highest level of productivity and carrying capacity; upon keeping as many acres as possible open to the public for recreational uses related to wildlife; and upon preventing, insofar as possible, the destruction or depreciation of wildlife habitat as a result of activities directed toward achievement of other purposes. The consideration of possible solutions at this time is concerned specifically with lack of public access, destruction or alteration of habitat, and the deficiency of waterfowl habitat.

Lack of Access - Posting

101. Lack of public access is, and probably will continue to be, the major limiting factor affecting hunting opportunity in the Basin. Land is predominantly in private ownership and thus subject to being closed to public hunting whenever the owner decides to do so. Farmers who have had buildings, fences, stock, or crops damaged by hunters or other trespassers invariably post their lands. Many holdings once operated as farms have been and are being bought by individuals or groups to use for other purposes and these lands are then commonly posted. In addition, private lands in proximity to urban areas are usually posted because trespassers become a nuisance. No-trespass and no-hunting signs, in short, are rapidly becoming a common sight and no reversal of this trend, in the near future at least, is anticipated.

102. Lands which are posted against hunting are often used for hunting recreation by the owners and a few of their close friends. This, however, usually results in under-harvesting the game species, especially when posting covers a large block of contiguous holdings.

103. The posting problem, whatever the reasons for it, really results in the wasting of resources which, if properly handled, could compatibly be managed to produce recreational and economic benefits for the people of the Basin and the entire service area. A widespread understanding of these benefits and development of a common feeling of determination to get the most out of fish and wildlife resources would pave the way, however, to a solution. State fish and game agencies could encourage efforts to reach a solution and foster better landowner-hunter relationships through greater emphasis on these points in their educational programs.

Private Preserves

104. Part of the solution, undoubtedly, lies in working out procedures whereby the land-owner directly benefits from allowing his acreage to be hunted. In fact, this solution to the problem lies at the base of a trend toward establishment of private non-profit club or family-type shooting preserves whereby, through payment of annual fees to the landowner, the hunters are able to reserve to themselves the privilege of hunting on certain lands. About seven percent of the lower subbasin's farm-game acreage is in private hunting preserves. The situation is somewhat less advanced in the upper subbasin. This trend is expected to continue and, unless steps are taken to modify it, probably by 2020 forty percent of the area suitable for hunting will be in private preserves.

105. If operated at maximum capacity commensurate with sustained yield management, private preserves could provide hunting opportunities for a large segment of the demand. Most preserves, however, are operated for a select few, which results in limiting overall hunting opportunity in the Basin, aside from the fact that generally this represents less than optimum management of the resource. Better understanding and recognition on the part of both landowners and hunters of the value of managing on the basis of maximum sustained annual harvest of game could help overcome the adverse effects of the present shooting preserve concept.

106. To the extent a more desirable concept of the shooting preserve in relation to wildlife management and capability for meeting needs cannot be developed, growth in the number of preserves will cut farther and farther into the capability of the resource base for recreation as well as for being a major economic betterment factor in the basin. A change in state law so as to limit the number and size of private hunting clubs might be advisable but perhaps not politically feasible. About the only other course to counteract this trend would be to accelerate state programs for acquisition and development of public hunting areas.

Park Prohibitions

107. Little, if any, hunting is permitted on state park lands in New York (there are no lands in the Basin in Pennsylvania in this category). Except for areas intensively developed for general recreation which are being used during the hunting season, or where restrictions are otherwise necessary for reasons of safety, efficient operation, or protection of public property, it would seem that the policy in this matter might well be changed, to the overall advantage of the public and the economic welfare of the Basin.

Urban Encroachment

108. Urban growth, together with industrial and agricultural intensification, effectively destroys wildlife habitat and curtails hunting opportunities. These activities in themselves are marks of progress toward betterment of certain vital aspects of life in the Basin. The problem is, of course, how to integrate and maintain fish and wildlife resources to achieve maximum environmental quality.

109. The Basin's 1960 population of 425,000 will have increased to 880,000 by the year 2020. The greatest population growth will occur in the northern 1/3 of the Basin. The impact of this doubling of population within 60 years can be visualized better perhaps when it is considered that construction of a single house, lawns and driveways included, eliminates about 1/4 acre of what may have been huntable wildlife territory. Added to this is a safety zone extending 500 feet in all directions from each occupied dwelling or cluster of dwellings. "Strip development" along roads, moreover, may effectively prevent hunter access to interior lands otherwise huntable.

110. The impact of urban and rural developments such as are considered here could be alleviated by local zoning regulations. The state fish and game agency could assist town planners or their consultants in determining which lands should be set aside to be maintained as public hunting areas.

111. Solving the problems of posting, private preserve developments, park land restrictions, and urban and rural encroachment is largely, perhaps, beyond the scope of a comprehensive water development program. Such a program, however, does offer opportunities for solving these problems to the extent that public hunting lands can be provided in conjunction with reservoir development.

Waterfowl Habitat Deficiency

112. Waterfowl habitat is in short supply in the Basin and, it follows, so are opportunities for waterfowl hunting. There has been a constant and rapid reduction of waterfowl habitat over the years as a result of agricultural, industrial, and municipal development. This has been aided and abetted by single-purpose water resource developments such as the construction and operation of Mount Morris Dam and Reservoir for flood control and to a certain extent by efforts to drain the Groveland Flats on Canaseraga Creek.

113. The most important wetland units in the Basin are the Groveland Flats on lower Canaseraga Creek, the dozen or so oxbows along the main stem downstream from Mount Morris Dam, Birdsall Swamp on the headwaters of Black Creek (tributary of Angelica Creek), the shallow swamps associated with Honeoye, Canadice, Hemlock, and Conesus Lakes, and the wooded seasonally-flooded wetlands downstream from Groveland Flats to the mouth of Canaseraga Creek. All of these areas, with the possible exception of Birdsall Swamp, are in danger of being eliminated or reduced in area or effectiveness by land-use changes. There is little opportunity for replacement. More of the existing wetlands should be placed in public ownership if we are to meet future recreational needs insofar as possible, not only for hunting but for opportunities to observe and photograph waterfowl.

114. The value of the Groveland Flats and its potential for increased waterfowl value have been the subject of a separate planning study by the New York Division of Fish and Game, the Soil Conservation Service, the Corps of Engineers, and this Bureau. As a result a plan has been prepared which would not only preserve but enhance the wetlands wildlife values and yet reduce the adverse effects of flooding upon agricultural interests. This plan will be incorporated as a part of the basin-wide plan for use and development of water and related land resources.

115. Were we planning today for construction of Mount Morris Dam and Reservoir, undoubtedly the adverse impact of flood control on the waterfowl habitat and hunting use in the area to be protected from flooding would be recognized by all concerned and steps would be taken to mitigate these losses. To have done so would certainly have been in the best interests of securing maximum overall benefits from the waters and related land resources.

116. While Mount Morris Dam is not the subject of our planning study, the unmitigated losses are with us and it would be as much (or even more so) in the public interest to take steps toward mitigation today as it would have been prior to 1952. Mitigation could be accomplished by acquisition and development of the oxbow lakes and marshes along the main stem downstream from Mount Morris Dam as part of the comprehensive water resource development program.

117. The shallow swamps associated with Honeoye, Canadice, Hemlock, and Conesus Lakes are being converted by development agencies into land-fill areas for cottages. These developments have a two-fold effect - destruction of waterfowl habitat and elimination of critically needed spawning areas for certain game fishes. What remains of these swamps should be saved and improved in its values for waterfowl habitat, hunting recreation, and fish spawning grounds.

118. Water resource development projects may afford opportunities to recoup waterfowl habitat and hunting losses elsewhere and permit improvement by facilitating a more even distribution of the resource base.

Of the 13 Corps of Engineers' sites studied (see table N-6), only one has considerable potential for waterfowl development. The Summit Site, on Black Creek, also identified as SCS Site 7-2, and generally known as Birdsall Swamp, could provide for an estimated 1,500 man-days of waterfowl hunting per year, with additional highly significant values for waterfowl production and migration use. With subimpoundments and controlled flooding, a 1,200-1,400 acre impoundment could provide 250-400 acres of prime habitat.

119. Of the 226 Soil Conservation Service sites studied, eight have significant potentials for waterfowl habitat development and hunting use. These sites are listed in table N-7, in the order of priority for construction. The table also shows impoundment size and potential amounts of hunting use and dollar value of hunting recreation. Site 7-2, however, at elevation 1180 would eliminate waterfowl habitat and hunting values.

FISH AND WILDLIFE CONSERVATION AND DEVELOPMENT PLAN

BASIC CONCEPTS

120. In light of the foregoing discussion of problems and possible solutions relative to needs for fish and wildlife resources, it is evident that meeting future needs will require that present capability of the existing resources be not only maintained but improved, that measures be taken to assure maximum use of existing resources, and that every opportunity be taken to create new habitat to develop additional resources.

121. This Bureau, in cooperation with the New York Division of Fish and Game and after discussions with other agencies involved in this comprehensive study, has selected from the possible solutions available what would appear to be the essential elements of a plan best suited to meet fish and wildlife needs of the immediate future, i.e. as of 1980[1/]. These elements can be grouped into five major categories or objectives:

a. Conservation and development of existing resources and their ability and availability to provide recreational opportunity;

b. Creation of additional lake-type fishing habitat and development of it to obtain maximum productivity, maximum recreational quality, and maximum fishing use, with special emphasis upon impoundments (1) capable of producing trout and (2) located in the southern part of the Basin;

c. Augmentation of low flow where necessary to improve the quantity and quality of stream fisheries in late summer and counteract current irrigation demands;

d. Elimination of pollution from streams in which it is a limiting factor in providing fishing opportunity; and

e. Creation and development of additional waterfowl habitat to increase waterfowl production and recreational opportunities related to this wildlife resource.

1/ Other possible solutions remain available obviously for meeting long-range needs - i.e. subsequent to 1980

CONSERVATION AND DEVELOPMENT OF EXISTING RESOURCES

122. Significant areas of fish and wildlife habitat were discussed under "Resource Capability and Present Use" and were touched upon also (from the standpoint of various adverse factors) in the discussion of problems and possible solutions. These habitat areas are shown on plate I.

123. The direct responsibility for action to conserve and develop these areas is largely that of the State through its Division of Fish and Game in its Conservation Department. Such responsibility can be effectively met, however, only with strong public support. Present indications are that the Division will be able, with such support, to bring the present capabilities of the Basin's fishery resources to the level of supporting 715,000 man-days of annual use by 1980 and to at least maintain the present capability of its wildlife resources, especially the waterfowl habitat still remaining and recreational use of it, which in 1960 was estimated to be 4,000 man-days of hunting and 15,000 days of bird-watching.

124. The possible approaches to accomplishing this were discussed under "Fish and Wildlife Problems and Possible Solutions" and will not be repeated here. Many are already part of the continuing programs of the game and fish agencies, some need to be instituted, some need to be accelerated, and, in addition, no doubt new approaches need to be and will be developed to meet the problems involved.

125. Suffice it to say that conservation and development of existing resources will be an extremely important element of any plan which seeks to meet future needs related to fish and wildlife resources. It should receive high priority attention and aggressive action on the part of all who wish to see fish and wildlife resources make their maximum contribution to meeting recreational needs in - and supporting the economy of - the Genesee Basin.

CREATION AND DEVELOPMENT OF RESERVOIR FISHERIES

Selected Reservoir Sites.

126. In addition to conservation of existing resources and maximization of their capabilities for meeting needs, opportunities for fishing could be created by construction of dams at suitable locations. The impoundments listed in table N-8 represent a refinement of information presented in the discussion of possible solutions to fishery problems. These sites are considered best suited to meeting the needs of 1980, according to the criteria mentioned in paragraph 121(b) applied to available engineering and operational data. Locations are shown on plate III.

Table N-8 - Impoundment Sites Selected to Increase Lake Fishing Opportunities for Meeting 1980 Needs, Genesee Basin New York and Pennsylvania

NYSCD REGION	Reservoir Site	Agency	Name of Stream	Conservation Elevation	Pool Acres	Type of Fishery	Fishing Opportunity Annual No. of Man-Days W/O Proj.	With Proj.	Net Gain	Annual $ Value of Benefits
2	Stannard	CE	Genesee R.	1590	1,510	Trout	8,000	120,500	112,500	$450,000
2	Portage	"	Genesee R.	1160	4,100	Warmwater	400	300,400	300,000	150,000
1	Tuscarora	"	Keshequa Cr.	784	660	Trout	---	49,500	49,500	198,000
2	8-13	SCS	Wigwam Cr.	1627	227	Trout	200	17,200	17,000	68,000
2	10-3	"	Rush Creek	1690	122	Trout	100	9,300	9,200	36,800
2	3-1	"	Chenunda Cr.	1725	216	Trout	200	16,400	16,200	64,800
2	9-3	"	Caneadea Cr.	1723	72	Trout(or W.W.)	100	4,500	4,400	17,600
2	7-2	"	Black Creek	1705 1/	1,440	Warmwater	200	103,100	102,900	308,700
1	17-1	"	Canadice Cr.	1140	202	Trout	300	15,900	15,600	62,400
1	17-7	"	Mill Creek	1000	124	Trout	200	9,500	9,300	37,200
1	13-22	"	Sugar Creek	1313.5	94	Trout	200	7,200	7,000	28,000
1	11-4	"	East Koy Cr.	1742	92	Trout	2,000	8,900	6,900	27,600
1	13-11	"	Newville Cr.	1003.5	57	Trout	100	4,400	4,300	17,200
1	11-2	"	East Koy Cr.	1691.5	335	Trout	2,500	27,600	25,100	100,400
1	17-19	"	Spring Cr.	932	392	Warmwater	400	24,000	23,600	70,800
1	19-7	"	Bigelow Cr.	700	155	Warmwater	200	9,500	9,300	27,900
2	7-1	"	Baker Cr.	1495	127	Trout	---	9,500	9,500	38,000
2	3-4	"	Marsh Cr.	1607	156	Warmwater	tr.	9,400	9,400	28,200
1	17-12	"	Gates (Bebee)Cr.	898.5	500	Warmwater	0	30,000	30,000	90,000
2	13-5	"	Canaseraga Cr.	1240	210	Trout	300	16,100	15,800	63,200
	Totals				10,791		15,450	792,900	777,500	$ 1,884,800
	Total Trout				4,048		14,200	316,500	302,300	1,209,200
	NYSCD Region 1				(1,564)		(5,300)	(123,000)	(117,700)	(470,800)
	NYSCD Region 2				(2,484)		(8,900)	(193,500)	(184,600)	(738,400)
	Total Warm-Water				6,743		1,200	476,400	475,200	675,600
	NYSCD Region 1				(1,047)		(600)	(63,500)	(62,900)	(188,700)
	NYSCD Region 2				(5,696)		(600)	(412,900)	(412,300)	(486,900)

1/ Elev. 1705 preferred over 1711; 1705 gives maximum waterfowl habitat values.

127. Reservoir fishery values given in table N-8 are those which would be incidental to creation of the impoundments and additional fishery habitat. Losses in fishing use due to inundation of present habitat have been deducted. Impact upon wildlife resources has not been evaluated at this point, but it appears to be minor in most cases. Where necessary, it is assumed that wildlife losses will be mitigated. This will be discussed in connection with the impact of the comprehensive plan.

Development for Maximum Use

128. Additional benefits could be realized by providing adequate parking areas for cars and boat trailers and by installing boat launching ramps in conjunction therewith. The areas should each be one-acre in size, with parking capacity for forty cars and 40 trailers. Ramps should be constructed of pre-stressed concrete and be 12 feet in width. Average annual cost of a parking area and accompanying launching ramp is estimated to be $2,500 in round numbers, derived as follows:

Item	Capital Cost	Annual Cost
One-Acre Parking Area & Launching Ramp (12'wide)	$ 8,000	$ 318[1/]
Toilets (2)	6,000	239
Supervision		1,000
Maintenance		1,200
Total Annual Cost		$ 2,757
Total Annual Cost of above with 24' wide ramp[2/]		$ 3,234

1/ 3-1/8% for 50 years

2/ at Sites 17-19 and 19-7

129. On the average, fishing opportunity with these access facilities provided would be 133 percent of the net incidental fishery benefits shown in table N-8. Benefits derived from this development would well justify the costs of the improvements, as shown in table N-9. Under existing law, however, the Federal share of such costs would be limited to 50 percent, as is true for all separable cost items intended to benefit fish and wildlife.

130. Further use of the fishing opportunities created by the reservoirs listed in table N-8 would result from installation of fish attractors and fishing piers to improve the recreational quality and availability of fishing opportunity. The sites where these would be effective are shown in table N-10, together with the benefits and costs.

Table N-9 - Additional lake fishing opportunities resulting from providing adequate parking and launching facilities at reservoirs, Genesee Basin, New York & Pennsylvania

NYSCD Region	Reservoir Site	Agency	Type of Fishery	No. of Areas and Ramps Needed	Added Days of Fishing Opportunity	An. $ Value Added Fisherman-Days	Annual Cost of Areas, Ramps, & Toilets	Net Annual $Value
2	Stannard	CE	Trout	5	37,500	$150,000	$ 14,000	$136,000
2	Portage	"	Warm-water	8	100,000	50,000	22,400	27 600
1	Tuscarora	"	Trout	2	16,500	66,000	5,600	60,400
2	8-13	SCS	Trout	1	5,700	22,800	2,800	20,000
2	10-3	"	Trout	1	3,000	12,000	2,800	9,200
2	3-1	"	Trout	1	5,400	21,600	2,800	18,800
2	9-3	"	Trout (or WW)	1	1,400	5,600	2,800	2,800
2	7-2	"	Warm-water	3	34,300	102,900	8,400	94,500
1	17-1	"	Trout	1	5,200	20,800	2,800	18,000
1	17-7	"	Trout	1	3,100	12,400	2,800	9,600
1	13-22	"	Trout	1	2,400	9,600	2,800	6,800
1	11-4	"	Trout	1	2,300	9,200	2,800	6,400
1	13-11	"	Trout	1	1,400	5,600	2,800	2,800
1	11-2	"	Trout	1	8,400	33,600	2,800	30,800
1	17-19	"	Warm-water	3	7,800	23,400	7,200	16,200
1	19-7	"	Warm-water	3	3,100	9,300	7,200	2,100
2	7-1	"	Trout	1	3,200	12,800	2,800	10,000
2	3-4	"	Warm-water	1	3,100	9,300	2,800	6,500
1	17-12	"	Warm-water	2	10,000	30,000	4,800	25,200
2	13-5	"	Trout	1	5,200	20,800	2,800	18,000
	Totals			34	259,000	$627,700	$106,000	$521,700
	Total Trout			17	100,700	402,000	53,200	349,600
	NYSCD Region 1			(8)	(39,300)	(157,200)	(22,400)	(134,800)
	NYSCD Region 2			(9)	(61,400)	(245,600)	(30,800)	(214,800)
	Total Warm-water			17	158,300	224,900	52,800	172,100
	NYSCD Region 1			(2)	(20,900	(62,700)	(19,200)	(43,500)
	NYSCD Region 2			(15)	(137,400	(162,200	(33,600)	(128,600)

Table N-10 Additional Lake - Fishing Opportunities
Resulting From Installation of Fish Attractors
Genesee Basin, New York and Pennsylvania

NYSCD Region	Reservoir Site	Agency	Type of Fishery	Fish Attractors Needed	Added days of Fishing Use	An. Value of Gain in Fisherman-Days	Annual Cost of Attractors	Net Annual Value of Attactors
2	Portage	CE	Warm-water	70	2,300	$ 3,400	$ 300	$ 3,100
2	7-2	SCS	" "	30	1,000	3,000	100	2,900
1	17-19	"	" "	7	200	600	30	570
1	19-7	"	" "	3	100	300	10	290
2	3-4	"	" "	3	100	300	10	290
1	17-12	"	" "	8	300	900	30	870
Totals				121	4,000	$ 8,500	$ 480	$ 8,020
	(Rounded)					(8,500)	(500)	(8,000)

Table N-11 Additional Use of Reservoir Fisheries Anticipated
as Result of Installing Fishing Piers
Genesee Basin, New York and Pennsylvania

NYSCD Region	Reservoir Site	Agency	Type of Fishery	Fishing Piers Needed	Added Days of Fishing Use	An. Value of Gain in Fisherman-Days	Annual Cost of Piers	Net Annual Value of Piers
2	Portage	CE	Warm-water	20	90,000	$180,000	$66,000	$114,000
2	7-2	SCS	" "	8	36,000	108,000	26,400	81,600
1	17-19	"	" "	2	9,000	27,000	6,600	20,400
1	19-7	"	" "	1	4,500	13,500	3,300	10,200
2	3-4	"	" "	1	4,500	13,500	3,300	10,200
1	17-12	"	" "	2	9,000	27,000	6,600	20,400
Totals				34	153,000	$369,000	$112,200	$256,800

131. Fish attractors improve fishing, particularly in the case of warm-water fisheries, by concentrating both forage and game fish in their vicinity. Details of placement and the type of construction and materials used will need to be worked out with the New York State Division of Fish and Game, but cost can safely be estimated to be about $100 per unit, and the number needed will average about one attractor to 60 surface acres of water. It is estimated that attractors will increase annual use of the fishery by 33 fisherman-days per unit and will provide better quality angling (improved success ratio), so that this additional use can be assigned a value of $1.50 per day.

132. In a somewhat similar manner, fishing piers located at strategic points around the lake shore will provide higher quality recreation and attract additional fishing use. It is estimated that such additional use will amount to 4,500 fisherman-days, annually, per pier. On the basis of improved recreational quality, these additional fisherman-days can be assigned a unit value of $2.00 per day for Portage and Site 1-5. At other reservoirs, user value will be equal to the premium rates already assigned, i.e. $4.00 for trout fishing and $3.00 for warm-water angling.

133. These piers will cost $45,000 apiece for initial construction. Amortized over a 50 year period at the rate of 3 1/8 percent (as has been done in connection with determination of the annual costs of all investments mentioned in this report), this amounts to an annual cost of $1,800 per pier. Added to this would be the amount of $1,500 to cover annual costs of operation, maintenance, and replacement. Total annual costs, therefore, are estimated to be $3,300. Total benefits and costs in connection with fish piers at reservoir sites selected from the list in table N-8 are shown in table N-11.

SUMMARY OF RESERVOIR FISHERY VALUES

134. In table N-12, the fishing opportunities which would come about incidental to reservoir construction and those which would be provided by developments to assure maximum use of the reservoir potential are summarized. Included in this table, also, is a comparison between the annual dollar-value assigned to the total man-days of fishing recreation and the annual cost, including charges for construction, operation, and maintenance, of each of the several reservoirs.

135. Annual fishery values, it will be seen, generally far outweigh project costs in the case of these sites selected from those studied by the Soil Conservation Service to be part of the fish and wildlife plan. Under existing Federal law and policy, however, it is unlikely that any of these would be considered justified for construction with Federal funds on the basis of these fish and wildlife values. In view of the recreational needs to be met and the economic benefits which could accrue from increased fishing activity in the Basin, it is hoped that the attention of the Congress will be directed toward this situation at such time as it may be considering authorization of any works in connection with the Genesee Basin comprehensive plan.

Table N-12 - Summary of fishing opportunities and annual fishery values resulting from creation and development of reservoir fisheries fish and wildlife plan, Genesee Basin, New York & Pennsylvania

NYSCD Region	Reservoir Site	Agency	Potential Use in Fisherman-Days: Incidental to Constr.	With Ramps & Parking	With Fish Attractors	With Fish Piers	Total Fisherman-Days	Type of Fishery	Net Benefit of Fishing Use in $	An. Cost of Reservoir
2	Stannard	CE	112,500	37,500			150,000	Trout	$586,000	$1,180,000
2	Portage	"	300,000	100,000	2,300	90,000	492,300	Warmwater	294,700	1,300,000
1	Tuscarora	"	49,500	16,500			66,000	Trout	258,400	590,000
2	8-13	SCS	17,000	5,700			22,700	Trout	88,000	39,500
2	10-3	"	9,200	3,000			12,200	Trout	46,000	11,800
2	3-1	"	16,200	5,400			21,600	Trout	83,600	68,800
2	9-3	"	4,400	1,400			5,800	Trout(or WW)	20,400	31,100
2	7-2	"	102,900	34,300	1,000	36,000	174,200	Warmwater	487,700	49,000
1	17-1	"	15,600	5,200			20,800	Trout	80,400	35,900
1	17-7	"	9,300	3,100			12,400	Trout	46,800	45,100
1	13-22	"	7,000	2,400			9,400	Trout	34,800	36,700
1	11-4	"	6,900	2,300			9,200	Trout	34,000	19,400
1	13-11	"	4,300	1,400			5,700	Trout	20,000	37,000
1	11-2	"	25,100	8,400			33,500	Trout	131,200	17,600
1	17-19	"	23,600	7,800	200	9,000	40,600	Warmwater	108,000	31,500
1	19-7	"	9,300	3,100	100	4,500	17,000	Warmwater	40,500	34,100
2	7-1	"	9,500	3,200			12,700	Trout	48,000	25,100
2	3-4	"	9,400	3,100	100	4,500	17,100	Warmwater	45,200	112,700
1	17-12	"	30,000	10,000	300	9,000	49,300	Warmwater	136,500	32,600
2	13-5	"	15,800	5,200			21,000	Trout	81,200	72,300
Totals			777,500	259,000	4,000	153,000	1,193,500		$2,671,400	$3,770,200

136. It should also be noted that fishery values are sufficient to cover a significant portion of annual costs of either Stannard or Tuscarora projects and, to a lesser extent, the Portage project.

IMPROVEMENT OF STREAM FISHERIES

Low-Flow Augmentation

137. At the present time, there are few tributaries of Genesee River in New York State which maintain water temperatures within the optimum range for trout (50° - 70°F) throughout the summer; in fact, most of the streams in the upper reaches of the watershed are nearly dry during the summer months. With few exceptions, the tributaries of Genesee River provide little or nothing in the way of habitat which would permit natural reproduction to take place successfully and a carry-over of a resident trout population from year to year.

138. If the flows shown in table N-13 were provided, small as they are, there would be additional fishing opportunity created to the extent of 7,200 man-days of trout stream fishing and 400 man-days of warm-water stream fishing. Additional use in this amount would have a recreational value of $29,100 annually.

139. There would be additional benefits, also, in the form of savings in stocking required and improved quality of the fishery. Stocked trout not caught by the angler in one season could survive until the next spring; natural reproduction could take place to supplement the stocking program; and more abundant populations of food organisms would develop to improve stream carrying capacity for fish. These habitat benefits have not been measured in dollars and cents.

140. It is evident, however, when the cost of stored water is weighed against the rather paltry benefits shown in most instances, that habitat improvement through low-flow augmentation to improve primarily the quantity of habitat is not a paying proposition. The annual costs of water needed are shown in table N-13. These were computed as follows (using Chenunda Creek and Site 3-1 as an example):

Required - 4.0 cfs, 4 months (July-October); 120 days.
Stream distance = 5.5 miles
Transmission losses = 10% pmi. X 5.5 = 55%
Av. Release at site = 4.0 cfs X 155% = 6.20 cfs
Required storage = 6.2 cfs (1.983)(120) = 1,470 AF
Assumed evaporation losses = 13%
Total required storage = 1,470 X 113% = 1,660 AF

Table N-13 - Supplementary Fishing Opportunities and Dollar Values thereof to be Gained through Low-Flow Augmentation in Selected Streams, Genesee Basin, New York and Pennsylvania

NYSCD Region	Reservoir Site	Construction Agency	Stream Augmented	Stream Miles Affected	Type of Fishery	CFS to Augment Jul 1-Oct 30 Flow	Acceptable Temperature Range °F	Increase in Potential Use Fisherman-Days	Annual Value in $$	An. Cost of Water
2	Portage	CE	Genesee R.	40.0	Warm-water	17	60-80	200	$ 300	$203,490
2	Stannard	"	Genesee R.	40.0	Trout	20	55-70	300	900	-----
2	8-13	SCS	Wigwam Cr.	4.5	Trout	2	55-70	100	400	8,600
2	10-3	SCS	Rush Cr.	6.5	Trout	2	55-70	100	400	9,600
2	3-1	SCS	Chenunda Cr.	5.5	Trout	4	55-70	500	2,000	10,000
2	9-3	SCS	Caneadea Cr.	10.0	Trout	3	55-70	100	400	19,600
2	7-2	SCS	Black Cr.	8.0	Warm-water	5	60-80	200	300	13,310
1	17-7	SCS	Mill Cr.	1.6	Trout	2	55-70	200	800	17,300
1	17-12	SCS	Honeoye Cr.	10.0	Trout	5	55-70	100	400	3,000
1	13-22	SCS	Sugar Cr.	2.0	Trout	2	55-70	200	800	6,300
1	11-2	SCS	East Koy	12.0	Trout	5	55-70	800	3,200	5,900
1	13-11	SCS	Newville Cr.	1.5	Trout	2	55-70	100	400	12,300
1	13-11	SCS	L.Dansville	13.5	Trout	2	55-70	300	1,200	15,770
1	13-5 1/	SCS	Canaseraga	4.0	Trout	4	55-70	400	1,600	9,100
Totals				169.1		79		7,600	$29,100	
	Total Trout			121.1		57		7,200	28,500	
	NYSCD Region 1			(54.6)		(26)		(6,100)	(24,400)	
	NYSCD Region 2			(66.5)		(31)		(1,100)	(4,100)	
	Total Warm-water			48.0		22		400	600	
	NYSCD Region 1			(----)		(--)		(---)	(---)	
	NYSCD Region 2			(48.0)		(22)		(400)	(600)	

1/ Stony Brook Site

From "Preliminary Upstream Reservoir Studies" =

1. From Structure Data Sheet: Sed. & Floodwater Storage = 5,773 AF. Therefore total storage = 5,773 + 1,660 AF = 7,433 AF.
2. From stage-storage curve: 7,433 AF corresponds to elevation 1,723 (emergency spillway crest).
3. T. O. Dam elev. = 1,723 + 10 = 1,733 (10' determined from structure data sheet).
4. From cost-top curve: Total cost = $1,125,000

Annual Installation Cost - Amortized 100 yr. @ 3 1/8% =

$1,125,000 (.0327) =	$36,800
O. & M. Annual (Assume)	5,000
Total Annual	$41,800

$41,800 ÷ 7,433 (A.F.) = Approx. $6 per acre foot.
Low flow augmentation requires 1,660 acre-feet.
Annual cost of low-flow augmentation = $9,960

Water Quality Control

141. About 94.9 miles (1,176.5 acres) of Genesee River and its tributary streams are polluted to the extent that water quality is unsuited for game fishes. It has been assumed in the water quality studies of this Basin that waste treatment to 85 percent efficiency can be provided by 1980 and that a 90 percent level of efficiency can be reached thereafter. These percentages refer to removal of the bio-chemical oxygen demand (BOD). The studies have indicated, however, that low-flow augmentation in critical reaches would be required in addition to the above levels of treatment to maintain a dissolved oxygen level of 4 mg/l (or better).

142. Four mg/l is still inadequate for maintaining desirable game fish populations. The minimum level of dissolved oxygen to support a warm-water stream biota capable of providing attractive sport-fishing opportunities is 5 mg/l and for a cold-water biota, 6 mg/l, with 7 mg/l required in reaches used by trout for spawning. Provisions for low-flow augmentation after fullest possible BOD reduction at the source should be adequate to bring dissolved oxygen to the levels stated above in reaches otherwise suitable as either warm-water or cold-water game-fish habitat. Maintenance of these levels will provide an additional 81,900 man-days of fishing opportunity. Of these, 60,400 will be warm-water fishing in the streams (52.5 miles; 841.5 acres) of New York Region 1, requiring only the maintenance of 5 mg/l dissolved oxygen for adequacy. Also in Region 1, there will be a gain of 4,800 man-days of trout stream fishing opportunity in 23.7 miles (223.1 acres). In Region 2, New York, 16,700 man-days of trout stream fishing will be added with reclamation of 18.7 miles of stream (111.9 acres). The annual values of these additional fishing opportunities will be $270,900, $19,000, and $70,700, respectively, or a total of $270,900 for water quality control. Total annual value of the benefits would amount to $250,000.

CONSERVATION AND DEVELOPMENT OF WATERFOWL HABITAT

143. On the wildlife side of the coin, we are looking principally at the waterfowl picture. A number of facilities have been selected, as shown in table N-14, on the basis of engineering and economic feasibility as determined by the Corps of Engineers or the Soil Conservation Service. The development of the Groveland Flats area on Canaseraga Creek to conserve and enhance the waterfowl resources (as well as to serve the interests of the agricultural community) has been covered in considerable detail in a separate report. Pertinent details have been included here.

144. Reservoir zoning regulations will need to be applied in some instances to bring about compatibility between use of areas for fish and wildlife purposes and for general recreation. A low dam at Site 14-2 will make possible the development of an excellent waterfowl area. Present thinking is that this should be the dominant water-related use at this site. At Site 15-2, it appears reasonable to develop general recreation on 1/2 of the area, 360 acres, with the remainder being devoted primarily to waterfowl management. At Site 7-2, also, it is planned that 440 acres out of a total of 1,440, would be developed for waterfowl management, the remainder for general recreation and fishing use.

145. As shown in tables N-14 and N-15, construction of the sites selected for improving waterfowl habitat and providing opportunities for increased use of waterfowl resources would provide benefits measurable in waterfowl-use days, bird-watching days, and hunter days. Maximum potential development and use of Groveland Flats is anticipated within 20 years after installation, or between 1970 and 1990. With-the-project figures for that area have been scaled down from 1990 to reflect values anticipated by 1980. It is assumed that other areas will have reached full production by 1980.

146. Construction of the facilities listed would provide opportunity for an increase in waterfowl habitat amounting to 1,645 acres. This additional habitat plus improvement in quality of existing habitat would permit and encourage an increase in waterfowl use for stop over of migrating birds in spring and fall and for nesting and rearing young. Total waterfowl use by 1980 would increase by 1,926,600 waterfowl days, annually. Waterfowl production would increase by 1,770 ducklings and 340 goslings reared to flight stage each year. There would be 12,400 more man-days of waterfowl hunting opportunity provided and the increased numbers of waterfowl during spring and fall migrations would be of a magnitude at certain sites to attract additional bird watchers to the extent of 29,800 bird-watching days.

147. The benefits from creating additional waterfowl habitat and improving that which already exists would be worth $239,300, annually, by 1980. This is based upon alternative justifiable expenditure figures

Table N-14 - Selected facilities to help meet needs for increased waterfowl habitat by 1980, Genesee Basin New York and Pennsylvania

NYSCD Region	Reservoir Site		Agency	Elevation in feet above MSL	Surface acres of Water	Waterfowl Habitat: Ac. without project	Waterfowl Habitat: Ac. with project	Waterfowl Use in Days without project	Waterfowl Use in Days with project	An. Habitat Value: $ without project	An. Habitat Value: $ with project
1	Groveland Flats		CE		3,140	3,140	3,140	986,800	2,362,000*	$122,300	$293,000*
2	Black Creek	(7-2)	SCS	1,705	1,440	440	440	24,500	103,800	3,000	12,900
2	Baker Creek 1/	(7-1)	SCS	1,495	127	---	20	---	3,900	---	500
2	Marsh Creek 1/	(3-4)	SCS	1,604	156	---	15	---	3,000	---	400
1	Pearl Creek	(14-2)	SCS	1,000	200	40	130	5,200	30,500	600	3,800
1	Jaycox Creek	(15-2)	SCS		720	25	360	3,100	85,100	400	10,600
1	Honeoye Inlet	(17-5)	SCS		1,100	40	1,100	20,500	331,700	2,500	41,100
1	Gates Creek	(17-11)	SCS		109	20	20	1,500	3,900	200	500
1	Oatka Creek	(18-5)	SCS		138	100	100	12,100	24,200	1,500	3,000
1	Gates(Bebee)Cr.	(17-12)	SCS	898.5	500	25	150	3,100	35,300	400	4,400
	Totals				7,630	3,830	5,475	1,056,800	3,417,400	$130,900	$424,100

1/ Principal value is for warm-water Fishery (see table N-7) *1980 Figures = 84.4% of Ultimate reached by 1990.

Net gains in use:	1980	1990-2020	Net gains in value: 1980	1990-2020
Waterfowl days: Region 1	1,840,400	2,274,400	$228,500	282,400
Region 2	86,200	86,200	10,800	10,800
Totals	1,926,600	2,360,600	$239,300	$293,200
(Rounded)	1,927,000	2,361,000		

Table N-15 - Waterfowl hunting and bird watching opportunities provided by selected facilities, Genesee Basin New York and Pennsylvania

NYSCD Region	Reservoir Site	Agency	Annual No. Hunter Days Without Project	Annual No. Hunter Days With Project	An. $ Value Hunter-Days Without Project	An. $ Value Hunter-Days With Project	An. Bird Watching Days Without Project	An. Bird Watching Days With Project	An. $ Value Bird Watching Without Project	An. $ Value Bird Watching With Project
1	Groveland Flats	CE	2,500	6,300 2/	$15,000	$37,800 3/	15,000	37,800 2/	$ 7,500	$18,900 2/
2	7-2	SCS	300	1,600	1,800	9,600				
2	7-1 1/	SCS	---	100	---	600				
1	14-2	SCS	100	500	600	3,000				
1	15-2	SCS	---	1,300	---	7,800				
1	17-5	SCS	300	4,800	1,800	28,800	---	7,000	---	3,500
1	17-11	SCS	---	100	---	600				
1	18-5	SCS	100	400	600	2,400				
1	17-12	SCS	---	600	---	3,600				
	Total		3,300 2/	15,700	$19,800	$94,200	15,000	44,800	$ 7,500	$22,400

1/ Principal value is for warm-water fishery (see table N-7).

2/ Refers only to present use of project areas, not the Basin.

3/ Groveland Flats will develop 84.4% of potential by 1980; 100% by 1990.

Net gains:	Annual No. Hunter Days 1980	Annual No. Hunter Days 1990-2020	Annual $ Benefits 1980	Annual $ Benefits 1990-2020	No. of Bird-Watching Days 1980	No. of Bird-Watching Days 1990-2020	$ Value: Bird-Watching Days 1980	$ Value: Bird-Watching Days 1990-2020
Region 1, NYSCD	11,000	12,200	$66,000	$73,200	29,800	37,000	$14,900	$18,500
Region 2 "	1,400	1,400	8,400	8,400	---	---	---	---
Total gain	12,400	13,600	$74,400	$81,600	29,800	37,000	$14,900	$18,500

applicable to this general area. Added to this would be a recreational benefit from increased hunting worth $74,000, annually, and an annual benefit attributable to birdwatching in the amount of $14,900. Total annual wildlife benefits from this plan of development, in monetary terms, would thus amount to $328,200 as of 1980.

SUMMARY OF BENEFITS FROM FISH AND WILDLIFE PLAN

148. Implementation of the plan discussed in the foregoing paragraphs would conserve and develop present fishery resources to maximum capabilities and availability. As a result, these resources would be able by 1980 to provide a total of 715,000 days of fishing opportunity. As shown in table N-16, Region 1 of the New York Division of Fish and Game would have a capability of 70,000 trout stream-fishing days, 6000 man-days of warm-water stream fishing, and 574,000 man-days of warm-water lake fishing. Region 2 would be able to handle 22,000 man-days of trout stream-fishing, 42,000 man-days of trout lake fishing, and 1,000 man-days of warm-water stream fishing. On the basis of this capability, existing fishery resources have an estimated net recreational value amounting to $2.9 million, annually.

149. The plan would provide additional fishing opportunities in the amount of 1.3 million fisherman-days, annually. Thus, with the capability of existing resources augmented by creation and development of new habitat, there would be 2.0 million man-days of fishing opportunity by 1980, or 95 percent of the anticipated demand for 2.1 million man-days and 51 percent of the anticipated demand, 3.9 million man-days, in 2020.

150. There are other advantages to this plan from the standpoint of meeting needs related to fish and wildlife resources. It would place emphasis on maximum possible expansion of trout fishing, providing additional opportunities for trout stream-fishing to the extent of 25,500 man-days and trout lake-fishing to the extent of 403,000 man-days, annually.

151. The plan endeavors, moreover, to emphasize development of lake-type fisheries in the southern portion of the Basin. To that end, it envisions construction of 10 new lakes in that area, including the large bodies of water provided by Portage and Stannard Reservoirs. These lakes would provide 246,000 additional man-days of trout lake-fishing and 683,600 additional man-days of warm-water lake fishing in the southern part of the Basin.

152. The wildlife resources of the Basin are roughly estimated to be capable of providing 1,648,700 man-days of hunting opportunity. This is a general estimate covering all types of hunting. It is further estimated that the present wildlife resources have an overall net recreational value for hunting amounting to $5 million dollars, annually. These resources

Table N-16 - Effect of Fish and Wildlife Plan on capability for meeting
1980 recreational needs related to such resources
Genesee Basin, New York and Pennsylvania

	Present Use		Use Capability, 1980, through Fish & Wildlife Plan					
	No. Man-Days per Year		Full Use - Present Resources		With the Plan: Net + or -		Total Use Capacity	
	Fish	Wildlife	Fish	Wildlife	Fish	Wildlife	Fish	Wildlife
Region 1; NYSDFG								
Trout Streams	42,400 1/		70,000		8,800		78,800	
Trout Lakes	30,400				157,000		157,000	
Warm-water Streams	4,500		6,000		60,400		66,400	
Warm-water Lakes	251,600		574,000		106,900		680,900	
Hunting:								
Waterfowl		3,000 1/		3,000		10,000 2/		13,000
Other Species		380,500		984,500				984,500
TOTALS	328,900	383,500	650,000	987,500	333,100	10,000	983,100	997,500
Bird-Watching		15,000		15,000		29,800		44,800
Region 2; NYSDFG								
Trout Streams	10,900		22,000		16,700		38,700	
Trout Lakes	21,400		42,000		246,000		288,000	
Warm-water Streams	700		1,000				1,000	
Warm-water Lakes					683,600		683,600	
Hunting:								
Waterfowl		300		300		1,400		1,700
Other Species		255,500		649,500				649,500
TOTALS	33,000	255,800	65,000	649,800	946,300	1,400	1,011,300	651,200
Bird-Watching		-		-		-		-
TOTAL USE: Fishing	368,400		715,000		1,279,400		1,994,400	
Hunting Waterfowl		3,300		3,300		11,400		14,700
All Hunting		639,300		1,637,300				1,648,700

1/ Do not add across.

2/ Allowance for Groveland Flats development to only 6,300 by 1980.

are worth conserving and developing. If their present capability is maintained, they could more than meet the needs for 1.3 million man-days of hunting opportunity anticipated by 1980, although they could supply only 74 percent of the projected 2020 demand for 2.3 million hunter-days.

153. The plan also would bring about a significant contribution to the waterfowl habitat resources of the Basin and provide additional waterfowl hunting opportunity to the extent of 11,400 hunter-days annually. There would then be 14,700 waterfowl-hunting days annually, and although this represents only 22.6 percent of the estimated 1980 demand for 65,000 waterfowl-hunting days and only 10.5 percent of the year 2020 demand — 140,000 hunter-days — it would still be a significant improvement.

154. Finally, the plan would bring about greater concentrations of waterfowl at Groveland Flats in spring and fall; it would develop a locus for a new concentration at Honeoye Inlet (SCS 17-5); and it would prolong and increase the use of these areas by waterfowl, shore birds, and other interesting wildlife species throughout the greater part of the year. As a result, it is anticipated that bird-watchers and other students of nature will be attracted to the extent of an additional 22,800 bird-watching days, annually.

155. The annual net benefits of the plan, measured in dollars, are summarized in table N-17. The value of the present resource base in 1980 is not included; values are shown only for additions to the resource base and certain special improvements which project facilities would make possible. The annual value of fishery benefits by 1980 would amount to 3.0 million and that of wildlife benefits, $.4 million.

156. Unit values for hunter, fisherman, or bird-watcher day were developed in accordance with Supplement No. 1 to Senate Document 97 (87th Congress, 2nd session). These figures are presented for the purpose of comparing benefits and costs in project justification.

157. While not applicable to benefit-cost analysis, it is useful also from the economic standpoint to consider expenditures of hunters and fishermen, as discussed under "Economic Impact of Demand" earlier in this report. Resources of the Basin under the fish and wildlife plan could accommodate 134,000 fishermen, annually, and these fishermen could be expected to spend $12.8 million annually in connection with their sport. Wildlife resources would provide hunting opportunity for 127,000 hunters in 1980. Only 98,000 hunters, however, are expected to be using the Basin by that time, so annual hunter expenditures would only amount to $7.7 million. Altogether, then, the potential market for goods and services needed by hunters and fishermen and which could be served by the Basin will amount to $20.5 million a year by 1980.

Table N-17 — Net Annual Dollar Value of Potential Benefits (1980)
From Implementation of Fish and Wildlife Plan
Genesee Basin, New York and Pennsylvania

Source of Benefits	Annual Value of Benefits in Dollars				
a. Fisheries	NYSDFG Region 1		NYSDFG Region 2		Total
	Trout	Warmwater	Trout	Warmwater	Fisheries
1. Impoundments					
Incidental	$470,800	$188,700	$738,400	$486,900	$1,884,800
Enhancement					
Parking & Ramps	134,800	43,500	214,800	128,600	521,700
Fish Attractors		1,700		6,300	8,000
Fish Piers		51,000		205,800	256,800
2. Stream Improvements					
Low-Flow Augmenta.	7,800				7,800
Quality Control	19,000	181,200	70,700		270,900
Totals	$632,400	$466,100	$1,023,900	$827,600	$2,950,000

b. Wildlife (Waterfowl)	NYSDFG Region 1		NYSDFG Region 2			Total
	Habitat	Hunting	Watching	Habitat	Hunting	Wildlife
Impoundments						
Groveland Flats	224,600	30,000	15,000			$269,600
All other	57,800	43,800	3,500	10,800	8,400	124,300
Totals	$282,400	$73,800	$18,500	$10,800	$8,400	$393,900

IMPACT OF GENESEE BASIN COMPREHENSIVE PLAN ON FISH AND WILDLIFE RESOURCES

INTRODUCTION

158. The fish and wildlife plan discussed in the foregoing chapter is admittedly a single-purpose plan directed toward achieving equality between supply and anticipated 1980 demands or needs for such resources. It was built around means and measures, both structural and non-structural, which seemed best suited to meet those needs in terms of quality, quantity, kinds, and geographic distribution of such resources within the Genesee Basin. It was thus single-purpose in its objectives, even though many of the elements of the plan, particularly the structural elements, are multi-purpose in nature. Because of this, certain sites were selected for the fish and wildlife plan which do not appear in the comprehensive plan and vice versa.

159. It is the objective of comprehensive planning, of course, to develop a plan which will best meet not one but the many and varied needs of people within the designated planning area. Thus, the next step was the integration of the fish and wildlife conservation objectives for meeting needs of 1980 into the comprehensive plan for meeting all needs. This chapter presents an analysis of the extent to which this has been accomplished.

160. Location of the various elements of the comprehensive plan are shown on plate N-111. There are 35 upland reservoir projects designed by the Soil Conservation Service to meet various needs, either singly or as multiple-purpose projects. Another 29 reservoir projects designed by the Soil Conservation Service are located on the Ontario Lake Plains and their purpose is to irrigate farm lands. Implicit in the plan, also, is provision for secondary treatment facilities and, in two cases, advanced treatment for municipal wastes from 27 communities in the Basin, plus the equivalent of secondary treatment and in some cases additional treatment for industrial effluent discharged separately from municipal sewer systems.

161. Although several large, multiple-purpose reservoirs designed by the Corps of Engineers were studied, none of these was included in the final plan. As previously indicated, some of these would have been highly beneficial from the standpoint of fishing opportunities produced.

CREATION OF ADDITIONAL RESERVOIR FISHERIES

162. Fishery resources and fishing opportunities which will result from construction of upland reservoirs in the Basin, as designed by the Soil Conservation Service, are shown in table N-18. Estimates of potential fishing opportunities are based upon resources and use-capabilities resulting from construction of the reservoirs and maintenance of designated conservation pool levels, without any special measures to develop or encourage maximum use of the resource. The plan does not specifically include any such measures; evaluation, therefore, takes into account only the benefits incidental to project construction.

Table N-18 - Fishery values related to reservoir components of the Genesee Basin plan for water and related land resources New York and Pennsylvania

State	Reservoir Site	Constr. Agency	Name of Stream	Stream Fishery Type of Habitat	Stream Fishery An. Use Man Days	Conservation Pool Elevation in Feet	Conservation Pool Surface Area-Acres	Reservoir Fishery Type of Habitat	Reservoir Fishery An. Use Man-Days	With-the Project Use - Net Gain or Loss	With-the Project Net An. $ Benefit	Annual Cost of Reservoir
Pa. N.Y.	1-5	SCS	No name 1/	Trout	-	1773	110	W.W.(or T)	6,800	6,800	$10,200 4/	$94,400
Reg. 2	3-1	"	Chenunda Crk.	Trout	200	1725	216	Trout	16,400	16,200	64,800 5/	68,800
"	3-4	"	Marsh Creek	-	-	1607	156	Warm-water	9,400	9,400	28,200 6/	112,700
"	5-1	"	Vandermark Crk.	-	-	1646.5	138	"	8,200	8,200	24,600	49,400
"	5-21	"	Brimmer Crk.	-	-	2002	86	Trout	6,400	6,400	25,600	21,700
"	7-1	"	Baker Crk.	-	-	1495	127	Trout	9,500	9,500	38,000	25,100
"	7-2	"	Black Crk.	Warm-water	200	1711	1715*	Warm-water	103,100	102,900	308,700	157,100
"	8-13	"	Wigwam Crk.	Trout	200	1627	227	Trout	17,200	17,000	68,000	39,500
"	9-3	"	Canea[illegible]a Crk.	Trout	100	1723	72	Trout(or WW)	4,500	4,400	17,600	31,100
"	10-2	"	No name 2/	-	-	1594	52	Trout	3,800	3,800	15,200	18,500
"	10-3	"	Rush Creek	Trout	100	1690	122	Trout	9,300	9,200	36,800	11,800
"	10-14	"	No name 3/	-	-	1573	40	Trout	3,000	3,000	12,000	18,400
Subtotal	Reg. 2 N.Y.				800		2951		190,800	190,000	$ 639,500	$ 554,100
	Trout				(600)		(942)		(70,100)	(69,500)	(278,000)	(234,900)
	Warm-water				(200)		(2009)		(120,700)	(120,500)	(361,500)	(319,200)
N.Y. Reg. 1	11-2	"	E. Koy Creek	Trout	2500	1691.5	335	Trout	27,600	25,100	100,400	17,600
"	11-4	"	E. Koy Creek	Trout	2000	1742	92	Trout	8,900	6,900	27,600	19,400
"	13-1	"	No name 4/	-	-	1240	60	Trout	4,500	4,500	18,000	33,400
"	13-6	"	Sugar Creek	Trout	200	1348.5	243	Trout	18,200	18,000	72,000	86,300
"	13-22	"	Sugar Creek	Trout	200	1313.5	94	Trout	7,200	7,000	28,000	36,700
"	14-5*	"	Beard's Crk.	-	-	884	90	Trout	6,800	6,800	27,200	24,000
"	17-1	"	Canadice Crk.	Trout	300	1140	202	Trout	15,900	15,600	62,400	35,900
"	17-7	"	Mill Creek	Trout	200	1000	124	Trout	9,500	9,300	37,200	45,100
"	17-8	"	No name 6/	Warm-water	-	909	215	Warm-water	12,900	12,900	38,700	23,200
"	17-12	"	Gates(Bebee)Crk.	Warm-water	-	898.5	500	Warm-water	30,000	30,000	90,000	32,600
"	17-19	"	Spring Creek	Warm-water	400	932	392	Warm-water	24,000	15,000 10/	70,800	31,500
"	17-24	"	Gates Creek	Warm-water	-	1017.5	258	Warm-water	15,400	15,400	46,200	62,400
"	19-7	"	Bigelow Crk.	Warm-water	200	707	155	Warm-water	9,300	9,100	27,300	34,100
Subtotal	Region 1, N.Y.				6000		2760		190,200	175,600	$ 645,800	$ 482,200
	Trout				(5400)		(1240)		(98,600)	(93,200)	(372,800)	(298,400)
	Warm-water				(600)		(1520)		(91,600)	(82,400)	(273,000)	(183,800)
Grand Totals: N.Y. & Pa.					6800		5821		387,800	372,400	$1,295,500	$1,130,700
	Trout				(6000)		(2182)		(168,700)	(162,700)	(650,800)	(533,300)
	Warm-water				(800)		(3639)		(219,100)	(209,700)	(644,700)	(597,400)

1/ Trib. of Iris Settlement Brook
2/ Trib. #5 of Trib. 128 Genesee R. Houghton, N.Y.
3/ Trib. #130 Genesee R. Houghton, N.Y.
4/ Unit Value $1.50 per man-day, rounded to nearest $100
5/ Unit Value $4.00 per day, rounded to nearest $100 (trout)
6/ Unit Value $3.00 per day, rounded to nearest $100 (warm-water)
7/ Trib. of Canaserage Creek
8/ Trib. of Honeoye Crk.
9/ Trib. of Black Creek
10/ No. of Man-Days reduced approx. 1/3 because of effects of drawdown.

* NOTE: This acreage at elev. 1711 will destroy valuable and much needed habitat; max. pool should not exceed 1440 acres, elevation 1105.

*Assumed that 14-4 and 14-5 are mutually exclusive. Deleted 14-4.

163. It is estimated that, during the period from 1970 (or whenever construction is completed) through 2020, the potential average annual use of fishery resources created incidental to project construction will be at the rate, generally, of 75 man-days per acre for trout lakes and 60 man-days per acre for those producing warm-water species of the kinds most desirable for sport fishing. This applies also to those designated as single-purpose fishery reservoirs insofar as resources and use are not affected by measures other than reservoir construction alone.

164. Not all of the upland reservoirs included in the plan will develop significant fisheries.

165. Reservoirs which might turn out to be best for either trout or warm-water species, but for which a clear-cut determination could not be made at this time, were evaluated on the basis of whichever habitat seemed most likely to develop. In the case of those which might be "two-storied", that is, both trout and warm-water fisheries in combination, the appraisal was made on the basis of whichever it seemed would be the major attraction for fishermen at the particular site.

166. The 35 upland sites within Genesee Basin which became part of the plan include 15 of the 17 which were presented in the preceding chapter as part of the fish and wildlife plan for meeting 1980 needs for fishery resources. The reservoirs in the comprehensive plan will create lakes providing 2,182 surface acres of trout waters and 3,639 surface acres of warm-water habitat.

167. Of the new trout habitat created, 942 surface acres will result from seven reservoirs located in the upper part of the Basin (Region 2 of the New York State Division of Fish and Game). Another eight reservoirs to be constructed in the northern portion of the Basin (New York's Region 1) will provide 1,240 surface acres of trout water. Region 2 will gain an estimated 69,500 man-days of trout fishing opportunity; Region 1, 93,200.

168. Three new warm-water lakes will increase this type of habitat to the extent of 1,734* surface acres in New York's Region 2, while 1,520 surface acres in five more lakes will be added in Region 1. Another 110 surface acres will be provided by construction of one impoundment in the Pennsylvania portion of the Basin. The additional man-days of warm-water fishing opportunity will amount to 120,500 in Region 2, 82,400 in Region 1, and 6,800 in Pennsylvania.

169. The site in Pennsylvania, it will be noted, might become a cold-water, warm-water, or "two-storied" fishery. The same is true of Site 9-3 in Region 2, New York. For the purposes of this report, however, the former has been evaluated as warm-water, the latter as cold-water habitat.

* Based on Site 7-2 with maximum water surface at elevation 1105 surface area 1440 acres; not on elevation 1711, surface area 1715 acres, which would destroy 400 acres of waterfowl habitat.

170. Other than as shown in table N-18, loss of existing fishery habitat due to the comprehensive plan will be insignificant. Total loss due to the reservoirs listed in table N-18 amounts to 6,600 man-days, of which 5,800 represent trout fishing opportunity and 800, warm-water fishing. Of the former, 4,500 will occur as the result of impoundments on East Koy Creek, one of the best trout streams in the Basin.

171. Under the evaluation of the headwater sites in Section IV, Appendix B, of the comprehensive plan report, language of both the text and tables imply that construction of the upland sites will be recommended for meeting anticipated needs of 1980. Assuming that all reservoirs in table N-18 were constructed and in operation by that time, the total amount of new fishing opportunity in the Basin will amount to 372,400 man-days, annually, of which 162,700 will be trout-fishing opportunity and 209,700, warm-water.

IMPROVEMENT OF STREAM FISHERIES

Low-Flow Augmentation For Water Quantity

172. The comprehensive plan does not appear to provide specifically for any of the water quantity augmentation (See table N-12) desired for improving fish habitat and extending the effective length of season for trout fishing into the summer period when flow in many streams is unsatisfactory. Site 17-12, located on Gates Creek, a tributary of Honeoye, was included in the plan for low-flow augmentation to correct a pollution problem on Honeoye Creek downstream from Honeoye Falls; the average flow available, however, (3.70 cfs) is less than the augmentation flow required from the standpoint of quantity (5 cfs) during the period July 1 through October 31.

173. Another Site listed for low-flow augmentation for water quality, 13-27, is located on tributary number 8 of Mill Creek. It will serve as an alternative to advanced treatment in correcting a pollution problem downstream from Wayland in Mill Creek. Mill Creek is an excellent trout stream and while it has good flow, would benefit from 2 cfs augmentation to improve the <u>amount</u> of habitat during the period from July 1 through October 31. This represents a demand of 246 acre-feet upon reservoir storage which is given as only 230 acre-feet.

174. It does not appear that the comprehensive plan will provide any significant improvement of stream fisheries from the standpoint of water quantity.

Low-Flow Augmentation For Water Quality

175. Low-flow augmentation for water quality improvement will be provided by four of the 35 upland sites included in the comprehensive plan. Three of these are considered economically justified - Sites 13-27, 16-7, and 18-2. Another is included because it is nearly justifiable and becomes so when other benefits (fish and wildlife, etc.) are included. This is Site 17-12, which was discussed above, as was Site 13-27.

176. According to the plan, these four upland sites will correct water quality problems in four critical tributary streams, if secondary treatment is also provided in all critical stream reaches. Presumably this could all be accomplished in time to meet needs of the year 1980. The lower Genesee River pollution problems could be overcome by direct diversion of the major polluting effluent to Lake Ontario and the problem in the tributary reach at Silver Lake outlet can be solved by reregulation of Silver Lake outflow.

177. It is not clear, however, that these actions - secondary treatments, direct diversion, reregulation of outflow - are an integral part of the plan. In fact, it hardly seems that they could be so considered without assurances of action or cooperation on the part of those persons or agencies involved who are not a part of the comprehensive planning organization. Flow manipulation, moreover, may not be a solution, unless other values can be preserved. For example, lowering the level of Silver Lake too soon after northern pike have spawned could destroy this fishery and drawdown for stream quality improvement could destroy wildlife habitat in the marsh at the south end of the lake. No benefits, therefore, are assigned to the improvement of water quality either through low-flow augmentation or the other possibilities mentioned. This is regrettable because cleaning up the Basin's streams could provide 45,000 man-days or more of additional fishing opportunity with a potential value of at least $158,000 a year.

CONSERVATION AND DEVELOPMENT OF WATERFOWL HABITAT

178. Of the ten sites selected for waterfowl habitat conservation and development in the previous chapter, six are included in the comprehensive plan. These are the Canaseraga project designed by the Corps of Engineers and the Marsh Creek (3-4), Baker Creek (7-1), Black Creek (7-2), Jaycox Creek (15-2), and Gates (Bebee) Creek (17-12) sites designed by the Soil Conservation Service. In addition, another five of the upland sites included in the comprehensive plan will provide some waterfowl habitat and hunting benefits. The five are Erie Creek (16-2), Gates Creek (17-24), Bigelow Creek (19-7), Site 19-11 on a tributary of Black Creek, and Red Creek (20-2). All of the latter are located in New York Division of Fish and Game Region 1.

179. As in the case of fisheries, some reservoirs selected as being the best for waterfowl and included in the fish and wildlife plan were not included in the comprehensive plan while others selected for the latter were not included in the former because they were not among those most desired by fish and wildlife interests for the early action phase of construction.

180. The acres of habitat, numbers of waterfowl-use days, and annual values are shown in table N-19. Details of this analysis are similar to those discussed in the case of the fish and wildlife plan and need not be repeated here.

181. Even though improved waterfowl hunting opportunities, however, will result from construction of Sites 7-1, 7-2, 15-2, 16-2, 17-12, 17-19, 17-24, 19-11, and 20-2, hunters will not be able to take advantage of

Table N-19 - Waterfowl Habitat Values
resulting from early action plan
Genesee Basin, New York and Pennsylvania

NYSCD Region	Reservoir site	Constr. agency	Elevation in Ft. above M.S.L.	Surface acres of water	Waterfowl Habitat acres without Project	Waterfowl Habitat acres with project	Waterfowl Use-Days without project	Waterfowl Use-Days with the project	An. Habitat Value $ without project	An. Habitat Value $ with project
2	Marsh Cr.(3-4) 1/	SCS	1,604	156	-	15	-	3,000	-	400
"	Vandermark(5-1)	"	1,646.5	138	-		-		-	
"	Baker Creek(7-1) 1/	"	1,495	127	-	20	-	3,900	-	500
"	Fry Creek(7-2)	"	1,711 4/	1,715 4/	440	-	24,500	-	3,000	-
1	Canaseraga Project 2/	CE		3,140	3,140	3,140	986,800	2,362,000	122,300	293,000
"	Jaycox Crk.(15-2)	SCS	756	720	25	360	3,100	85,100	400	10,600
"	Erie Crk.(16-2)	"	1,332.5	180	-	180	-	12,800		1,600
"	Gates(Bebee)Cr.(17-12)	"	898.5	500	25	150	3,100	35,300	400	4,400
"	Gates Creek(17-24)	"	1,005	258	-	200	-	25,000	-	3,100
"	Bigelow Crk.(19-7)	"	700	220	-	100	-	13,000	-	1,600
"	Black Crk. Trib.(19-11)	"	550	315	-	300	-	35,000	-	4,300
"	Red Crk.(20-2)		540	140	-	80	-	6,000	-	700
Totals				7,250	3,630	4,125	1,017,500	2,581,100	$126,100	$320,200
Subtotal N.Y. Reg. 1				(5,389)	(3,190)	(3,650)	(993,000)	(2,574,200)	(123,100)	(319,300)
Subtotal N.Y. Reg. 2				(1,861)	(440)	(475)	(24,500)	(6,900)	(3,000)	(900)

1/ Principal value is for warm-water Fishery (see table 7).
2/ Groveland Flats
3/ At 12.4¢ per waterfowl-use day
4/ At elev. 1711, waterfowl values will be insignificant.

NOTE: Full potential, Groveland Flats, Canaseraga Project 1990-2020:
2,796,000 waterfowl use days - Annual Value - $346,000

Net gain in use:	Waterfowl-use Days 1980	Waterfowl-use Days 1990-2020	Net Gain in Value 1980	Net Gain in Value 1990-2020
Region 1 NYSCD	1,581,200	2,015,200	196,200	249,200
Region 2 NYSCD	-17,600	-17,600	-2,100	-2,100
Total gains	1,563,600	1,997,600	$194,100	$247,100

these opportunities because of lack of adequate access facilities - at least, it is not apparent that such facilities are an integral part of the comprehensive plan. The only firm hunting opportunity improvement provided by the plan will be in connection with the waterfowl area at Groveland Flats (Canaseraga project, Corps of Engineers) where management by the New York Division of Fish and Game will make it possible to fully utilize the 3,800 additional man-days of waterfowl hunting opportunity which will develop.

182. Under Division of Fish and Game management, the Canaseraga project will also result in a gain in annual bird-watching recreation in the amount of 22,800 man-days.

IMPACT ON OTHER WILDLIFE RESOURCES

Upland Reservoir Sites - Genesee Basin

183. Generally speaking, other wildlife resources and recreation related to them will not be significantly affected by the upland reservoir sites. Exceptions are found in three cases, however. The Gates (Bebee) Creek site (17-12) will cause annual loss of 600 man-days of upland-game and 300 of big-game hunting opportunities. Spring Creek (17-19) and Bigelow Creek (19-7) sites will eliminate another 200 and 100 man-days of upland-game hunting, respectively. The small losses of upland wildlife habitat and hunting opportunity which will occur in connection with other sites will be compensated by minor enhancements of waterfowl habitat and hunting.

Upland Reservoir Sites - Ontario Lake Plain

184. Twenty-nine single-purpose upland reservoir sites on the Ontario Lake Plain are included in the plan. These were studied and designed by the Soil Conservation Service as a means of meeting needs for additional supplies of water to irrigate truck crops to be grown in the area lying west of Rochester (between Rochester and Lockport) and north of the New York State Barge Canal.

185. The Ontario Lake Plain Service Area lies outside the Genesee Basin, but it was included in the Department of Agriculture studies, as stated in Appendix "B", Plan Formulation, because of proximity to the Basin and because of the relationship between the river and the Barge Canal, which cross at Rochester. It is our understanding that this relationship involves a possible diversion of water from the canal to the service area with subsequent replacement being made from Genesee River flows.

186. The Ontario Lake Plain Service Area was not included within the scope of fish and wildlife studies related to the Genesee Basin Comprehensive Survey, but since these 29 reservoirs and the lands to be served are now part of the comprehensive plan, their potential impact on fish and wildlife will be discussed in light of general knowledge of the area.

187. In addition to the irrigated acreage as of 1964, 5,450 acres, these 29 reservoirs will provide sufficient water to irrigate approximately 13,000 acres. At the estimated rate of a total need for one acre-foot per

acre of land irrigated (the ratio used by the Department of Agriculture) this will require 13,000 acre-feet of water, or an average of 450 acre-feet per reservoir. Assuming an average depth of five feet, the average size of each would be 90 acres, making an estimated total of 2,600 acres taken up by storage reservoirs.

188. To the above acreage of upland habitat lost must be added the 13,000 acres of additional truck crops to be irrigated. The intensive type of agriculture which such crops demand leaves little room for wildlife and provides little or no hunting opportunity. To the losses thus occasioned must be added the additional posting against hunting which undoubtedly will occur on lands contiguous with those areas under irrigation. Using the very rough figure of 10 acres of wildlife habitat to support one man-year of hunting and 13 days as the average time each hunter spends afield during the hunting season, the loss of at least 20,300 man-days of upland-game hunting opportunity can be anticipated.

SUMMARY OF EFFECTS OF GENESEE BASIN PLAN

189. With the comprehensive plan in operation, the capability of the fish and wildlife resources of Genesee Basin for meeting anticipated needs related to fish and wildlife resources as of the year 1980 will be as shown in table N-20. This assumes that there would be no loss of capability of existing resources other than as discussed and allowed for in the foregoing paragraphs and tables.

190. The total of new fishery resources created by implementation of the comprehensive plan plus existing resources will provide for 1,096,000 man-days of fishing use, annually, as against an anticipated 1980 demand for 2,060,000 fisherman-days, or 53 percent. As of 2020, the relationship of supply to anticipated demand will amount to only 28 percent.

191. The comprehensive plans' impact upon wildlife resources, in spite of some reduction in upland-game and big-game hunting opportunity, will produce a significant improvement in the waterfowl resource. Man-days of waterfowl-hunting opportunity will amount to 11,800 as against a demand by 1980 for 65,000 man-days (18 percent). This represents only 8 percent of the anticipated demand in the year 2020 (140,000 man-days).

192. Other effects will be provisions for attracting an additional 22,800 man-days spent in observing waterfowl populations during peak periods of migration (the extent of demand for this has not been calculated) and a reduction of 20,300 man-days of upland hunting opportunties in the Ontario Lake Plain area, outside of the Basin but within the designated fish and wildlife resource service area.

193. It is important as well as interesting to note the benefits which arise from the several categories in which purposes of constructing the upland reservoir sites may be grouped. From information furnished by the Department of Agriculture, these categories are as follows:

Table N-20 - Effect of plan on capability for meeting 1980 recreational needs related to fish and wildlife resources Genesee Basin, New York and Pennsylvania

New York	Present Use No. of Man-days per year		Use-Capability 1980, through comprehensive plan					
			Full Use-Present Resources		With Project: Net + or -		Total Use Capability	
	Fish	Wildlife	Fish	Wildlife	Fish	Wildlife	Fish	Wildlife
Region 1, N.Y.S.D.F.G.								
Trout Streams	42,400		70,000				70,000	
Trout Lakes	30,400		84,000		102,300		102,300	
Warm-water Streams	4,500		6,000				6,000	
Warm-water Lakes	251,600		490,000		82,400		656,400	
Hunting:								
Waterfowl	-	2,500		2,500		3,800		6,300
Other Species		380,500		984,500		-1,200		983,300
Subtotals: Region 1	328,900	383,000	650,000	987,000	184,700	2,600	834,700	989,600
Bird-Watching: Region 1		15,000		15,000		22,800		37,800
Ontario Lake Plain Hunting						-20,300		-20,300
Region 2, N.Y.S.D.F.G.								
Trout Streams	10,900		22,000				22,000	
Trout Lakes	21,400		42,000		69,500		111,500	
Warm-water Streams	700		1,000				1,000	
Warm-water Lakes					120,500		120,500	
Hunting:								
Waterfowl		300		300				300
Other Species		255,500		649,500				649,500
Subtotals: Region 2	33,000	255,800	65,000	649,800	190,000		255,000	649,800
Grand Totals: New York								
Fishing	361,900		715,000		374,700		1,089,700	
Hunting:								
Waterfowl		2,800		2,800		3,800		6,600
Other Species (in basin)		636,000		1,634,000		-1,200		1,632,800
Lake Plain Hunting 1/						-20,300		-20,300
Pennsylvania								
Warm-water lakes 2/					6,800		6,800	
Basin Totals	361,900	638,800	715,000	1,636,800	381,500	-17,700	1,096,500	1,619,100

1/ The Ontario Lake Plain Service Area lies outside Genesee Basin; Figures shown represent only a rough estimate of impact of 29 reservoirs included in plan.

2/ Data on Penn. portion are incomplete as to extent of existing resource, since studies made of this relatively small area were not as intensive as in N.Y.

a. Single-purpose reservoirs for fish and wildlife conservation and development,

b. Multiple-purpose reservoirs in which fish and wildlife conservation and development is one of the purposes, and

c. Single-purpose reservoirs for other than fish and wildlife objectives.

194. The benefits both in terms of annual recreational use related to fish and wildlife and assigned annual values in dollars are shown for the above categories in tables N-21, 22, and 23, respectively.

195. Table N-24 summarizes the net annual dollar values of benefits from all aspects of the comprehensive plan.

Table N-21 - Benefits in terms of annual use opportunities and dollar values from construction of single-purpose upland reservoirs for Fish and Wildlife conservation and development
Genesee Basin Plan for water and related land resources

State	Reservoir Site	Stream	Fishery Benefits: Annual Use Trout	Annual Use Warm-water	Annual $Value Trout	Annual $Value Warm-water	Wildlife Benefits: Waterfowl Habitat and Use No. of Acres	An. Use-Days	An. $Value	Hunter-Days	Hunter Value
N.Y.R-2	3-1	Chenunda Creek	$16,200		$64,800						
"	5-21	Brimmer Creek	6,400		25,600		20	3,900	$500		
"	7-1	Baker Creek	9,500		38,000						
"	9-3	Caneadea Creek	4,400		17,600						
"	10-3	Rush Creek	9,200		36,800						
N.Y.R-1	11-4	E. Koy Creek	6,900		27,600						
"	13-1	No name	4,500		18,000						
"	13-22	Sugar Creek	7,000		28,000						
"	14-5	Beard's Creek	6,800		27,200						
"	17-1	Canadice Creek	15,600		62,400						
"	17-8	No name 3/		12,900		$38,700					
Totals			$86,500	$12,900	$346,000	$38,700	20	3,900	$500		

Table N-22 - Fish and Wildlife benefits in terms of annual use opportunities and dollar values resulting from construction of multiple - purpose upland reservoirs, Genesee Basin plan for water and related land resources

State	Fish and Wildlife Benefits from multi-purpose water storage Shared with:		Fishery Benefits: Net Annual Use Reg. Trout	Net Annual Use Reg. Warm-water	Net Annual $ Value Trout	Net Annual $ Value Warm-water	Wildlife Benefits: Waterfowl Habitat and Use No. of Acres	An. Use Days	An. $ Value	Other Wildlife Hunter-Days	Other Wildlife Hunter Value
	General Recreation:										
NYR-2	3-4	Marsh Creek		9,400		$ 28,200	15	3,000	$ 400		
" "	7-2	Black Creek		102,900		308,700		79,300	9,900		
" "	8-13	Wigwam Creek	17,000		$ 68,000						
NYR-1	13-6	Sugar Creek	18,000		72,000						
" "	15-2	Jaycox Creek					335	82,000	10,200		
" "	17-24	Gates Creek		15,400		46,200					
	Subtotals		35,000	127,700	$140,000	$383,100	350	164,300	$20,500		
	Irrigation:										
NYR-1	11-2	E. Koy Creek	25,100		100,400						
" "	19-7	Bigelow Creek		9,100		27,300				- 100	- $ 300
	Subtotals		25,100	9,100	100,400	27,300				- 100	- $ 300
	Water Quality:										
NYR-1	17-12	Gates(Bebee) Crk.		30,000		90,000	125	32,200	4,000	- 900 1/	- $3,600 1/
	Flood Protection:										
NYR-1	17-7		9,300		37,200						
	Totals		69,400	166,800	$277,600	$500,400	475	196,500	$24,500	- 1,000	- $3,900

1/ 300 man-days big-game @ $6.00 plus 600 man-days upland-game @ $3.00

Table N-23 - Fish and Wildlife benefits in terms of annual use opportunities and dollar values incidental to construction of other single-purpose upland reservoirs
Genesee Basin plan for water and related land resources

State	Fish and Wildlife benefits Incidental to single-purpose		Fishery Benefits Annual Use Trout	Annual Use Warm-water	Annual $ Value Trout	Annual $ Value Warm-water	Annual Wildlife Benefits Upland Hunting Use-Days	$ Value
	Recreation Reservoirs							
Pa.	1-5	No name Creek		6,800		$ 10,200		
NYR-2	5-1	Vandermark Creek		8,200		24,600		
" "	10-2	No name Creek	3,800		$15,200			
" "	10-14	No name Creek	3,000		12,000			
NYR-1	16-2	Erie Creek						
" "	19-11	No name Creek						
" "	20-2	Red Creek						
Subtotal - Recreation Reservoirs			6,800	15,000	27,200	34,800		
	Water Quality Reservoirs							
NYR-1	13-27	No name Creek	No Fish and Wildlife values					
" "	16-7	Wilkins Creek	Ditto					
" "	18-2	Belvea Creek	Ditto					
	Irrigation Reservoirs							
NYR-1	17-19	Spring Creek		15,000		70,800	- 200	- 600
	Ontario Lake Plains						- 20,300	- $40,600
	Municipal & Industrial Water Supply Reservoirs							
NYR-1	18-7	Oatka Creek	Unevaluated loss of excellent spawning area for brown trout.					
Totals			6,800	30,000	$27,200	$105,600	- 20,500	- $41,200

Table N-24 - Summary of Net Annual $ Values of Benefits from Conservation and Development of Fish and Wildlife Resources through Comprehensive Plan, Genesee Basin, New York and Pennsylvania

Source of Benefits	Annual Value of Benefits in Dollars						
	NYSDFG	Region 1	NYSDFG	Region 2	Pennsylvania		Totals
Fisheries	Trout	Warm-water	Trout	Warm-Water	Trout	Warm-Water	Fisheries
Impoundments:							
Single-Purpose F&WL	$163,200	$ 38,700	$182,800	-	-	-	$ 384,700
Multi-Purpose:							
Recreation-F&W	72,000	$ 46,200	68,000	$336,900	-	-	523,100
Irrigation-F&W	100,400	27,300	-	-	-	-	127,700
Water Quality-F&W	-	90,000	-	-	-	-	90,000
Flood Protection-F&W	37,200	-	-	-	-	-	37,200
Other Single-Purposes:							
Recreation	-	-	27,200	24,600	-	$10,200	62,000
Irrigation	-	70,800	-	-	-	-	70,800
Total Fisheries	$372,800	$273,000	$278,000	$361,500	-	$10,200	$1,295,500

Wildlife	Habitat	NYSDF&G Region 1 Hunting	Watching	NYSDF&G Region 2 Habitat	Hunting	Ontario Lake Plain	Totals
Impoundments:							
Waterfowl							
Canaseraga Project	$170,700	$ 22,800	$ 11,400				$ 204,900
Upland Projects							
Single-Purpose F&W				$ 500			500
Multi-Purpose							
Recreation &F&W	10,200			10,300			20,500
Water Quality &F&W	4,000						4,000
Other Single Purposes							
Recreation							
Irrigation							
Other Wildlife							
Big Game							
Multi-Purpose WQ-FW		- 1,800					- 1,800
Upland Game							
Multi-Purpose WQ-FW		- 1,800					- 1,800
Multi-Purpose I-FW		- 300					- 300
Single-Purpose Irrig.		- 600				- 40,600 1/	- 41,200
Total Wildlife	$184,900	$ 18,300	$ 11,400	$ 10,800		-$ 40,600	$ 184,800

1/ At $2.00 per hunter-day.

DISCUSSION

CONSERVATION AND ENHANCEMENT

196. The Fish and Wildlife Service, in cooperation with the Division of Fish and Game, New York State Conservation Department, and with assistance as appropriate from the Pennsylvania Fish and Game Commissions, has been responsible for the fish and wildlife aspects of the comprehensive study of water and related land resources, Genesee River Basin. Other participating agencies contributed much to planning for conservation and development of fish and wildlife as members of Task Group Number 9. The discussions of that group were most helpful in relating fish and wildlife objectives and the means of obtaining them to the possible solutions involved in achieving other goals. The results are reflected in the comprehensive plan.

197. Under the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661-666 inc.) the Service has the responsibility, in addition to participation in the planning processes, for analyzing the impact which the plan, when implemented, will have on fish and wildlife resources and for recommending means and measures whereby losses could be prevented or mitigated and maximum overall benefits be achieved. The Act provides also that the head of each State agency responsible for fish and wildlife who may have an interest in these matters be consulted.

198. The impact upon fish and wildlife resources of the Comprehensive Plan described in Appendix B of the Genesee Basin report was covered in the preceding chapter. The following paragraphs will be devoted to the subject of preventing loss and maximizing benefits from that plan.

PREVENTION OR MITIGATION OF LOSS

199. Generally speaking, the upland reservoirs within the Basin will create benefits which will far more than offset the usually minor losses of fish and wildlife habitat or related recreational uses which will accompany their construction.

200. The 29 upland reservoirs to be located on the Ontario Lake Plain, however, together with land use changes resulting from expanding the irrigated truck-farming area by 13,000 acres will cause a sizeable loss in wildlife resources and hunting opportunities. The extent of this adverse effect has not been investigated as thoroughly as the effects of structures within the Genesee Basin and, therefore, it would be appropriate for this part of the Genesee Basin plan to be carefully analyzed from the fish and wildlife aspect before any part of it is recommended for authorization, with a view to incorporating such means and measures as may be necessary and desirable to prevent loss and obtain maximum benefits.

201. The project designed by the Corps of Engineers for the Groveland Flats area on Canaseraga Creek will benefit waterfowl resources as well as agriculture. It is mentioned in this discussion, however, to emphasize that even under present conditions Groveland Flats is a highly valuable waterfowl habitat, with an estimated worth amounting to $122,300, annually. It provides, also, for related recreational uses which include 2,500 man-days of waterfowl hunting each season, worth $15,000, and 15,000 man-days of bird-watching each spring, valued at $7,500. Project costs, to the extent they are required to prevent loss of these existing annual benefits (total annual value, $144,800) should be considered a non-reimbursable Federal expenditure.

202. It is appropriate to mention here, also, that this Service believes all project costs attributable to conservation and development of waterfowl resources should be considered non-reimbursable, in recognition of the fact that husbandry and management of the continental waterfowl population is a Federal responsibility which our Government shares with those of Canada and Mexico.

DEVELOPMENT OF MAXIMUM FISHERY BENEFITS

Upland Reservoir Fisheries

Parking Facilities and Boat Access

203. Not more than about three-fourths of the fishing opportunity potential of a given site will be realized unless parking areas (and boat-launching facilities where needed) are provided. Boat-launching ramps are needed wherever the size of the body of water makes possible the use of boats too large to be easily transported by hand. Where boating is limited, naturally or administratively, to small boats and canoes, launching ramps would not be required.

204. Basically, we are thinking here in terms of an access unit which, as discussed previously in connection with the fish and wildlife plan (paragraph 128), would consist of about one acre of land, would permit the parking of 30-40 cars and boat-trailers, and would have a launching ramp, 12 feet wide, constructed of pre-stressed concrete. Such a unit, with the necessary toilets and other sanitation facilities, would cost an estimated $2,800 a year to build and operate. In some cases, a ramp 24 feet wide is recommended; for such areas the cost would be $3,200 a year. In others, where ramps are not needed at all, the annual cost would drop to $2,000.

205. Costs of these facilities and benefits in relation to the various upland reservoir sites in the Basin are shown in table N-25. Ramps 24 feet in width are recommended for boat access at Sites 5-21, 13-1, 13-6, 17-9, and 19-7, but no ramps at all are necessary at Sites 10-14, 13-24, 14-4 (or 14-5), nor at two of each of the three areas recommended for Sites 17-19 and 19-7.

206. Incorporation of the facilities listed in table N-25 in the comprehensive plan will add 54,300 man-days of trout-fishing opportunity, with a net annual benefit amounting to $172,800, and 70,000 man-days of warm-water fishing, with a net annual value of $165,900.

Table N-25 - Additional fishing opportunities to be gained from providing adequate parking and boat launching facilities at reservoirs, comprehensive plan, Genesee Basin, N.Y. & Pa.

State	Reservoir Site	Constr. Agency	Type of Reservoir Fishery	No. of Areas and Ramps Needed	Added days of Fishing Opportunity	Added $ Value Fisherman-Days	Annual Cost of Areas and Ramps	Net Annual $ Value
Pa.	1-5	SCS	Warm-water	1	2,200	$ 3,300	$ 2,800 1/	$ 500
N.Y.								
Reg. 2	3-1	SCS	Trout	1	5,400	21,600	2,800	18,800
" "	3-4	"	Warm-water	1	3,100	9,300	2,800	6,500
" "	5-1	"	Warm-water	1	2,800	8,400	2,800	5,600
" "	5-21	"	Trout	1	2,200	8,800	3,200 1/	5,600
" "	7-1	"	Trout	1	3,200	12,800	2,800	10,000
" "	7-2	"	Warm-water	3	34,300	102,900	8,400	94,500
" "	8-13	"	Trout	1	5,700	22,800	2,800	20,000
" "	9-3	"	Trout(or WW)	1	1,400	5,600	2,800	2,800
" "	10-2	"	Trout	1	1,200	4,800	2,800	2,000
" "	10-3	"	Trout	1	3,000	12,000	2,800	9,200
" "	10-14	"	Trout	1	1,000	4,000	2,000 2/	2,000
Totals Region 2 NYSDFG				13	63,300	$ 213,000	$ 36,000	$ 177,000
	Trout			7	(23,100)	(92,400)	(22,000)	(70,400)
	Warm-water			6	(40,200)	(120,600)	(14,000)	(106,600)
N.Y.								
Reg. 1	11-2	SCS	Trout	1	8,400	33,600	2,800	30,800
" "	11-4	"	Trout	1	2,300	9,200	2,800	6,400
" "	13-1	"	Trout	1	1,500	6,000	3,200	2,800
" "	13-6	"	Trout	1	6,100	24,400	3,200	21,200
" "	13-22	"	Trout	1	2,400	9,600	2,800	6,800
" "	14-5	"	Trout	1	2,200	8,800	2,000	6,800
" "	17-1	"	Trout	1	5,200	20,800	2,800	18,000
" "	17-7	"	Trout	1	3,100	12,400	2,800	9,600
" "	17-8	"	Warm-water	1	4,300	12,900	2,800	10,100
" "	17-12	"	Warm-water	2	10,000	30,000	4,800	25,200
" "	17-19	"	Warm-water	3	5,000 *	15,000	7,200	8,200
" "	17-24	"	Warm-water	1	5,200	15,600	2,800	12,800
" "	19-7	"	Warm-water	3	3,100	9,300	7,200	2,500
Totals Region 1 NYSDFG				20	58,800	$ 207,600	$ 47,200	$ 161,200
	Trout			10	(31,200)	(124,800)	(22,400)	(102,400)
	Warm-water			10	(27,600)	(82,800	(24,800)	(58,800)
Grand Totals								
	Trout			17	54,300	217,200	44,400	172,800
	Warm-water			17	70,000	206,700	40,800	165,900
	All Fisheries			34	124,300	423,900	85,200	338,700

1/ For a 1-acre parking area, a ramp 12' wide, and two toilets = An. Cost of Investment and O.M. & S = $2800.
Same, but ramp 24' wide, An. Cost = $3200.

2/ Annual cost of parking area, toilets, but no ramps =

2 pit toilets	$6,000 An. Cost	$ 200
	O & M	600
	Supervision	1,200
		$2,000

* Reduced 1/3 due to drawdown.

Fishing Piers

207. Use of the upland reservoir fisheries can be increased also by helping the shore-based fisherman and increasing his enjoyment of the sport. Fishing piers are a means to this end. Locate them if possible in close proximity to other shore-based recreational facilities but, above all, put them where there is good fish habitat - where the fish are most likely to be. The structure itself, of course, will act to attract fish and hold them in its vicinity.

208. Piers should be built in the form of an "L" or a "T". This makes it possible for a maximum number of fishermen to be accommodated at any one time. Three hundred feet of the length of each pier should extend over water at least four feet deep.

209. Various materials can be used in construction. If rock detritus, accumulated during the construction of the dam is available, this would be excellent. In this case, the fishing facility would be in the nature of a jetty and the openings among the rocks would become a very useful part of the local fishery environment. Wooden decking supported by piling, however, would do very well. A pier 10 feet wide and extending the required 300 feet over at least a four foot depth of water can be constructed at a cost of approximately $45,000.

210. In a fluctuating reservoir, it may be necessary to construct floating piers. Such piers, supported by blocks of styrafoam, can be built to the required length with a ten-foot width for about $50 a running foot or approximately $15,000 for a 300-foot structure. It is possible that maintenance of a floating pier of this type would cost more than a "permanent" wooden structure, but each type has inherent advantages and disadvantages from a maintenance point of view. Our analysis of costs and benefits is based upon the wooden deck supported by piling.

211. Table N-26 summarizes those costs and benefits. These piers would increase the likelihood that those who want to fish will find opportunities and conditions to their liking. As the table shows it can be anticipated that fishing piers will increase annual use by 22,500 man-days of trout fishing and 76,500 man-days of warm-water fishing. The net annual value of these benefits would amount to $73,500 and $168,900, respectively - a total of $242,400.

Species Control and Stocking

212. Stocking will be essential to the maintenance of attractive sport fishing opportunities at several of the upland reservoir sites. It will also be necessary to conduct a preimpoundment species control program in the watersheds tributary to several of them, reducing to a minimum existing species of non-game or game species undesirable for a particular site. This would be done by treating the upstream waters with rotenone just at the time of closure of the dam and prior to accumulation of any significant amount of water in the reservoir.

Table N-26 - Additional use of upland reservoir fisheries anticipated from installation of fishing piers, comprehensive plan for Genesee Basin, New York and Pennsylvania

State	Reservoir Site	Constr. Agency	Type of Fishery	No. of Fishing Piers Needed	Gain in Use Fisherman Days	Resultant Gain in An. Value: $	An. Cost of Investment OM & R	An. Value of Piers $ Net
Pa. N.Y.	1-5	SCS	Warm-water	1	4,500	$ 9,000 1/	$ 3,300	$ 5,700
Reg. 2	3-4	SCS	Warm-water	1	4,500	13,500	3,300	10,200
" "	5-1 2/	"	" "	1	4,500	13,500	3,300	10,200
" "	5-21	"	Trout	1	4,500	18,000	3,300	14,700
" "	7-2	"	Warm-water	8	36,000	108,000	26,400	81,600
" "	10-2	"	Trout	1	4,500	18,000	3,300	14,700
Subtotal Region 2				12	54,000	171,000	39,600	131,400
	Trout			(2)	(9,000)	(36,000)	(6,600)	(29,400)
	Warm-water			(10)	(45,000)	(135,000)	(33,000)	(102,000)
Reg. 1	13-1		Trout	1	4,500	18,000	3,300	14,700
" "	13-6		"	1	4,500	18,000	3,300	14,700
" "	14-5		"	1	4,500	18,000	3,300	14,700
" "	17-8		Warm-water	1	4,500	13,500	3,300	10,200
" "	17-12		" "	1	4,500	13,500	3,300	10,200
" "	17-19		" "	2	9,000	27,000	6,600	20,400
" "	17-24		" "	1	4,500	13,500	3,300	10,200
" "	19-7		" "	1	4,500	13,500	3,300	10,200
Subtotal Region 1				9	40,500	135,000	29,700	$105,300
	Trout			3	(13,500)	(54,000)	(9,900)	(44,100)
	Warm-water			6	(27,000)	(81,000)	(19,800)	(61,200)
Grand Totals				22	99,000	$315,000	$72,600	$242,400
	Trout			5	(22,500)	(90,000)	(16,500)	(73,500)
	Warm-water			17	(76,500)	(225,000)	(56,100)	(168,900)

213. Species to be controlled include white sucker, creek chub, and both the blacknosed and longnosed daces; in some watersheds, populations of chain pickerel and bullhead should be reduced, also. Then, as appropriate to the particular impoundment, trouts (rainbow, brook, or brown) and the largemouth and smallmouth black basses would be stocked to establish the desired type of fishery.

214. Upland reservoirs requiring pre-impoundment species control are listed in table N-27, together with annual costs of these measures. Pre-impoundment species control would be a one-time operation. Stocking, however, would be on an annual basis, except in the case of warm-water species. Total annual costs would amount to $15,000.

Aquatic Weed Control

215. Aquatic weeds are expected to become so abundant in the waters of Reservoirs 5-21 (Brimmer Brook) and 13-6 (Sugar Creek) that no fishing opportunities would be provided. The solution to this problem is aquatic weed control with suitable herbicides. Treatments will need to be repeated every 4-5 years at a cost of approximately $60[1/] per acre on an annual basis. If such treatments could be made on an annual basis, it would actually reduce the cost, bringing it down to about $15[2/] per acre, annually.

216. Under the latter schedule, Brimmer Brook site (86 surface acres) and Sugar Creek site (243 acres) would require annual expenditures for aquatic weed control amounting to $1300 and $3600, respectively.

Zoning for Maximum Recreational Use

217. Multiple-purpose use of a reservoir area has inherent in it the seeds of conflict. As the pressure of water-related recreational uses has explosively increased over the past two or three decades, zoning has proved an effective tool in obtaining maximum overall use with a minimum of conflict. Primarily, effective zoning regulations fall into two categories: (a) zoning by localities restricted to a certain kind of use (or uses) and (b) zoning by time within which, on a daily basis generally, certain uses will be permitted and others restricted.

218. Of the upland reservoir sites, four are listed in the comprehensive plan as single-purpose recreation sites, which would indicate that although some fishing-use might occur, fishing would not be a primary motivation for reservoir visitation. These reservoirs, however, (Sites 1-5 in Pennsylvania and 5-1, 10-2, and 10-14 in New York) would be capable of providing a total of 6,800 man-days of trout fishing and 15,000 man-days of warm-water fishing under proper management. It is the intention of

1/ Total periodic costs amortized at 3-1/8 percent over a 50-year period.
2/ Data from control in Lake Quannapowitt, Mass. (170 Acres).

Table N-27 - Upland Reservoir sites requiring stocking and species control, together with related costs, comprehensive plan Genesee Basin, New York and Pennsylvania

State	Reservoir Site	Water Shed Sq. Mi.	Surface Area Acres	Species Control Cost	Species	Impoundment Stocking Program Fingerlings	Yearlings	An. Cost
Pa.	1-5	19.5	110	$ 290 1/	Blackbass	1,600 2/	-	$ 50
					Trout	4,000	6,000	1,700
N.Y.								
Reg. 2	5-1	19.6	138	295	Trout	4,000	8,000	2,200
"	5-21	1.6	86	25	"	4,000	4,000	1,200
"	10-2	.9	52	15	"	3,000	3,000	900
"	10-14	1.0	40	15	"	2,000	4,000	1,100
Reg. 2	Subtotal			$ 350		13,000	19,000	$ 5,400
Reg. 1	13-1	5.0	60	75	"	6,000	3,000	1,000
"	13-6	16.3	243	245	"	24,000	12,000	4,000
"	14-5	1.1	90	25	"	9,000	4,500	1,500
"	17-19	7.5	690	110	Smallmouth	10,000 2/	-	360
"	17-24	3.1	258	45	Largemouth	-	250 3/	20
Reg. 1	Subtotal			$ 500		49,000	19,750	$ 6,880
	Total Trout			$ 695		56,000	44,500	13,600
	Total warm-water			$ 445		11,600	250	430
Grand Totals				$1,140 4/		67,600	44,750	$14,030

1/ For 1 treatment only (pre-impoundment.
2/ Initially, for 3 consecutive years.
3/ Adult largemouth blackbass, initial stocking only.
4/ At 3-1/8% for 50 years, An. Cost = $45. Therefore, total annual cost ($45 + $14,030) = $15,000 (rounded).

the States that they be managed so as to realize these fishery values as well as general recreation benefits. Use of large motors for boating, particularly on Sites 10-2 (52 acres) and 10-14 (40 acres) would need to be controlled. If water-skiing were to be permitted at Sites 1-5 (110 acres) and 5-1 (138 acres), regulations as to the hours it would be permitted during the day would be necessary in order to provide some undisturbed periods, such as early morning and late afternoon, when fishing could be enjoyed.

219. In the same way in which fishing-use would undoubtedly motivate visitations to reservoirs discussed in paragraph 216, so general recreational potentials would undoubtedly attract visitors to Sites 5-21 and 13-1, which are designated single-purpose fish and wildlife facilities in the comprehensive plan. It seems unrealistic to assume otherwise, nor would this prevent realization of maximum fishing-use benefits, provided that use of motor-boats was restricted in keeping with the small sizes (36 acres and 60 acres, respectively) of these two impoundments.

220. Sites 13-6 and 17-24 are designated as multiple-purpose facilities for fish and wildlife and general recreation. There is no reason that maximum benefits from these two lakes (243 and 258, acres, respectively) should not be realized provided that conflicts are avoided by zoning and regulations concerning use of motor boats. Water skiers, in particular, have been observed to have a penchant for cutting in close to piers or docks (and also swimming areas). This sort of activity, if not controlled, could nullify much of the value of the fishing piers recommended for these bodies of water and others.

221. Site 17-19, 392 surface acres created by a dam 23 feet high on Spring Creek, is described in the plan as being a single-purpose irrigation structure. The potentialities of this lake for providing fishing opportunity (and perhaps for general recreation, also) are such that multiple-use would seem much more appropriate. The combination of fish and wildlife and irrigation in this instance would not seem incompatible, although it is recognized (and accepted) that the full potentials incidental to reservoir construction, 31,000 man-days of warm-water fishing, annually, could not be realized. Even allowing for a reduction of one-third in annual-use potentials, which is the estimated impact of drawdown due to irrigation, a capability for providing 20,600 man-days of warm-water fishing, annually, would remain. In addition, construction of two fishing piers as recommended, would raise this to 29,600 man-days.

222. Site 17-19 should not, therefore, be considered a single-purpose irrigation reservoir. A water master appointed by the State of New York should be stationed on Spring Creek to regulate the use of available water in the best interests of irrigation and fish and wildlife combined. A determination should be made in advance as to the maximum permissible irrigation demand on the reservoir which would be reasonable and equitable in consideration of other uses affected as well as irrigation.

Stream Fisheries

Low-Flow Augmentation - Water Quantity

223. Trout streams of Genesee Basin, as previously stated, rarely have sufficient flow of cool water from July 1 through October 31 to provide satisfactory habitat or attractive trout-fishing opportunity. If relatively small amounts of cold water could be made available to augment the natural flows during that period of the year, considerable gain in trout fishing opportunity would result. Fall spawners such as the brown and brook trouts would also benefit.

224. The amounts of flow needed for augmentation and resulting benefits in terms of fisherman-use and monetary value of this recreation are shown in table N-28. In the case of Site 18-7, which is primarily for municipal and industrial water supply, releases will either preserve or destroy a two-mile reach of good brown-trout spawning habitat. From the dam site to route 19, releases should be in the range of 55-60°F. to preserve the fishery and spawning grounds. This would be a measure for preventing loss, since warm-water releases from Site 18-7 would eliminate the trout fishery in this reach.

225. From an enhancement standpoint, low-flow augmentation for the purpose of extending the fishing season on into the summer and early fall is generally not economically feasible for the Genesee Basin streams. The cost per acre-foot for the necessary storage and the number of acre-feet required were worked out for several sites and the annual costs for augmentation were compared with the dollar value of increased fishing opportunity. The results are shown in table N-29.

226. A comparison of the number of acre-feet needed with the storage capacity of the reservoir in each case also points up a physical disadvantage of attempting to supply low-flow augmentation, even though needs are small in terms of cfs, from reservoirs of a size comparable to those listed in table N-29. At best, augmentation demand would require 22-23 percent of reservoir storage capacity (Sites 3-1 and 13-22); for the remainder it varies between 61 to 71 percent. Since this is augmentation of the natural flow and it comes at a time when there is little opportunity to store any water, it undoubtedly would have an adverse effect upon reservoir fisheries.

227. Suffice it to say then, as regards low-flow augmentation for water quantity and temperature control, it is a desirable measure and if water is being released from a site on a trout stream or where trout habitat could be established, releases should be from a bottom outlet in order that they may be as cool as possible. Augmentation for improving late season water quantity could seldom, if ever, stand on its own feet as an enhancement measure, but should definitely be recognized and incorporated into the plan where necessary for prevention or mitigation of loss, as in the reach downstream from Site 18-7 on Oatka Creek.

Table N-28 - Benefits from improving stream habitat conditions through low-flow augmentation
Genesee Basin, New York and Pennsylvania

State	Res. Site	Stream Augmented		Type of Fishery	Miles Affected	No. cfs Jul.1-Oct. 31	Acceptable Temp. Range	Add. Man-Days Fishing Opportunity	An. $ Value of Benefit
N. Y.									
Reg. 2	3-1	Chenunda Crk.	FW	Trout	5.5	4	55-70° F	500	$ 2,000
" "	5-21	Brimmer Crk.	FW	"	4.0	2	"	80	300
" "	8-13	Wigwam Crk.	FW,Rec	"	4.5	2	"	100	400
" "	9-3	Caneadea Crk.	FW	"	10.0	3	"	100	400
" "	10-2	Trib. 128,Genesee	Rec	"	8.0	5	"	200	800
" "	10-3	Rush Creek	FW	"	6.5	2	"	100	400
Subtotals Region 2					38.5			1,080	$ 4,300
Reg. 1	11-2	East Koy Creek	FW,I	Trout	12.0	5	55-70° F	800	$ 3,200
" "	13-1	Canaseraga Crk.	FW	"		2	"	300	1,200
" "	13-6	Sugar Creek	FW,Rec	"	4.0	4	"	170	700
" "	13-22	Sugar Creek	FW	"	2.0	2	"	200	800
" "	17-7	Mill Creek	FW	"	1.6	2	"	200	800
" "	17-12	Honeoye Creek	FW,WQ	"	10.0	5	"	100	400
" "	18-7	Oatka	MI	"	2.5	4	"	80	300
	Subtotals Region 1							1,850	$ 7,400
	Grand Totals (rounded)							2,930 (2,900)	$11,700

TABLE N-29 - Comparison of Benefits with costs of flow-augmentation to improve quantity of summer-fall flows

State	Reservoir Site	Stream Augmented	Emergency Spillway Crest Elev.	Capacity at Spillway Crest: A.Ft.	Annual Costs of Reservoir: Installation	O & M	Total	An. Cost per A. Ft.	No. A. Ft. Needed	An.-Cost of Augmentation	An. $ Value of Fishing Benefit
N.Y.											
Reg. 2	3-1	Chenunda Creek	1,723	7,433	$67,200	$5,000	$72,200	$19	1,660	$16,600	$2,000
"	8-13	Wigwam Creek	1,624	1,215	36,100	5,000	41,100	34	780	26,500	400
"	9-3	Caneadea Creek	1,731	2,655	28,300	5,000	33,300	12	1,630	19,600	400
"	10-3	Rush Creek	1,688	1,225	8,500	5,000	13,500	11	875	9,600	400
Reg. 1	11-2	East Koy Creek	1,692	4,610	8,000	5,000	13,000	3	2,950	8,800	3,200
"	13-22	Sugar Creek	1,324	3,004	34,100	5,000	39,100	13	702	9,100	800

Low-Flow Augmentation - Water Quality

228. In the case of water quality improvement, the possibility for economic justification is greater because, generally speaking, it is as if a new fishery were being created. There are two ways in which this may occur. A stream or reach of stream may be so polluted that it does not support fish life or fish-kills occur periodically. Or a stream or reach of stream, even though it supports fish life (sometimes in abundance) is avoided because psychologically people are repelled by the thought of fishing in polluted waters. In either case, correction of the situation results in fishing opportunities which were previously not present.

229. In 1964 and 1965, the Federal Water Pollution Control Administration and the New York State Department of Health undertook a joint survey, collecting data from over 200 stations in the Genesee Basin (see Appendix "H"). There were 20 reaches on the main stem and on tributaries where water quality was adversely affecting sport fishing opportunities. Observations made by fishery biologists of the New York Division of Fish and Game indicate that in the interim between the 1964-65 surveys and the present time (April 1969) many of these adverse conditions were cleaned up, so that today fishing opportunities on 23 miles of trout streams (294 surface acres) and 13 miles of warm-water streams (135 surface acres) are again available to the fisherman. Annual use of the rehabilitated waters amounts to 29,100 fisherman-days (21,100 for trout, 8,000 for warm-water species). The annual value of the restored use amounts to $108,400, of which $84,300 comes from trout-fishing use and $24,100 from angling for warm-water fishes (see table N-30).

230. This improvement in the short span of 4-5 years is very encouraging. There remains, however, a very sizeable amount of additional cleaning-up to be done, as shown in table N-31. Still critically polluted are 19 miles of trout streams (40 surface acres) and 40 miles of warm-water streams (706 acres). The improvement of these could provide another 1,400 man-days of trout fishing and 52,400 of warm-water angling, annually, with recreational values amounting to $5,500 and $157,000, respectively - a total of $162,500.

231. The value of the reclaimed stream fisheries, $108,400, and the potential value of streams still in a polluted condition $162,500, amounts to a total of $271,000 in rounded figures. Earlier in this report (paragraphs 142 and 178) the amount of polluted streams and their potential fishery values were cited as approximately 100 stream miles, 45,000 man-days of fishing, and an annual recreational value thereof amounting to $250,000. The figures stated in this discussion, that is, 95 miles of stream, 82,800 man-days of fishing, and an annual value of $271,000 simply reflect a more precise analysis which has recently been completed.

Table N-30 - Stream reaches in which pollution has been eliminated since 1965 resulting in fishery benefits as shown
Genesee Basin, New York and Pennsylvania

Stream	Location	No. Miles formerly polluted	Acres of stream habitat	Type of Fishery	Fisherman Days per A. per Season	Total No. Fisherman Days per An.	Conditions as of April, 1969	Annual Value in $
Cryder Crk.	Downstream from Whitesville	6.1	22.7	Trout	100	2,270	Milk plant gone	$ 9,080
Dyke Crk.	" " Andover	3.6	15.3	"	100	1,530	Municipal sewage treated	6,120
Genesee R.	" " Wellsville	4.3	65.4	"	200	13,800	No longer polluted	55,200
Keshequa Cr.	" " Nunda	5.0	182.9	"	10	1,830	Minor sewage pollution remains	7,320
Mill Cr.	" " Perkinsville	4.3	8.2	"	200	1,640	Potato plant & oil pollut. gone	6,560
Oatka Cr.	" " Wyoming	2.2	10.4	Warm-water	30	310	Cannery gone	930
Genesee R.	" " Mt. Morris	3.6	65.4	" "	75	4,900	No problem at present	14,700
Honeoye Crk.	" " Honeoye	2.9	6.9	" "	30	210	" " " "	630
Black Crk.	" " Churchville	4.3	52.4	" "	50	2,520	" " " "	7,860
Totals for Rehabilitated Streams		36.3	429.6			29,110		$108,400
	Subtotal: Trout	(23.3)	(294.5)			(21,070)		(84,280)
	Subtotal: Warm-water	(13.0)	(135.1)			(8,040)		(24,120)

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Table N-31 - Critically polluted stream reaches for which the comprehensive plan contains no assurances for or schedule of correction
Genesee Basin, New York and Pennsylvania

Stream	Location	No. of Mi. Polluted	Acres of Stream Habitat	Type of Fishery	Potential Use Capability: Fisherman Days per A. per Season	Potential Use Capability: Total No. Fisherman Days per An.	Potential Use Capability: Annual Value in $	Type of Pollution
Angelica Crk.	Downstream from Angelica	4.7	8.5	Trout	10	80	$ 320	Municipal pollution
Wolf Crk.	" " Silver Springs	7.2	13.0	"	10	130	520	Salt pollution
Canaseraga Crk.	" " Dansville	2.9	8.6	"	100	860	3,440	Municipal & industrial wastes
Silver L. Outlet	" " Perry	4.3	10.4	Warm-water	30	310	930	Municipal wastes
Oatka Crk.	" " Warsaw	5.0	21.3	" "	30	640	1,920	Municipal and Ind. wastes
Wilkins Crk.	" " Livonia	1.8	2.6	" "	10	30	90	" wastes
Genesee R.	" " Avon	8.6	156.9	" "	50	7,840	23,520	Industrial wastes
Genesee R.	Upstream from Barge Canal	5.0	167.9	" "	100	14,190	42,570	Industrial wastes & municipal
Honeoye Crk.	Downstream from Honeoye Falls	10.1	91.6	" "	50	4,580	13,740	Municipal wastes
Honeoye Crk.	" " Rush	2.5	30.5	" "	50	1,520	4,560	" "
Genesee R.	Upstream from Lake Ontario	6.5	235.6	" "	100	23,560	70,680	Industrial wastes
Totals for Polluted Streams as of Apr. 1969		58.6	746.9			53,740	$162,290	
	Subtotal: Trout	(19.1)	(40.5)			(1,380)	(4,280)	
	Subtotal: Warm-water	(39.5)	(706.4)			(52,360)	(158,010)	

232. It would be desirable to bring the program of water-quality, improvement, which is obviously under way and has made great strides, fully into the comprehensive plan, so that the capability of the water and related land resources on which this program has an impact can be better weighed in the light of anticipated 1980 needs and those of subsequent years. It would seem that objectives in terms of time for accomplishing a given action could be scheduled. The obstacles which will delay accomplishment should also be pointed up. These would include the current scarcity of State and Federal matching funds for waste treatment facilities and the fact that there will be no main-stem reservoir storage as at the Portage site, which counted upon to correct conditions downstream from Avon and in the reach immediately upstream from the Barge Canal on the main stem.

Access to Streams

233. One objective of the comprehensive plan should be the conservation of benefits obtainable from existing resources in the Basin insofar as possible. One resource which can very easily be locked up so that its potential benefits cannot be enjoyed is the stream fisheries. Stream fishing opportunities can become increasingly unavailable to the fishing public unless access is assured.

234. To achieve this, it will be necessary to acquire through easements or in fee simple title access strips along the banks of the streams. According to present estimates, such access should be provided for a total of 99 miles along 19 different streams in order to prevent annual loss of 29,200 man-days of fishing opportunity. The estimated cost amounts to $242,500; funds should be provided from State and Federal sources to complete this action by the year 1980. Annual cost over a period of 50 years at 3-1/8 percent would amount to $9,600 in round numbers.

235. Supplementary to access strips of land along the streams, parking areas should be established at strategic locations to permit the public to fully avail itself of the stream fishing opportunities. Two streams in particular require such facilities within the immediate future. Brimmer Brook, in the four-mile reach downstream from Site 5-21, should have enough parking areas, well distributed along the stream, to permit parking of 120 cars. (This is also a reach requiring early acquisition of stream-bank access for fishermen).

236. Similar provisions should be made in the four-mile reach of Sugar Creek downstream from Site 13-6, assuming that provisions are made to augment the low summer flows.

237. Each parking site would be designed to allow parking of 20 cars. It is estimated these areas would cost approximately $6,000 each for acquisition and construction. This represents an annual cost of $250 each, amortized over a 50-year period at 3-1/8 percent. Each site can be expected to increase fishing use by 1200 man-days, with an annual value amounting to $4,800.

238. On this basis, an expenditure of $36,000 on Brimmer Brook, the equivalent annual cost amounting to $1,500, could be expected to reduce benefits of 7,200 fisherman days, with an annual recreational value amounting to $28,800. A similar result could be anticipated from installation of parking areas along Sugar Creek in the four-mile reach downstream from Site 13-6.

239. The locations for these and other parking areas along streams, as well as the acquisition of fishing easements or title in fee simple to lands along the stream banks, will continue to be handled as a part of the on-going program of the New York Division of Fish and Game or the Pennsylvania Fish Commission. It is highly important, however, to recognize these measures as an integral part of the comprehensive plan and an essential element in meeting, insofar as possible, the needs for fishing opportunities by the year 1980. Without such recognition, this aspect of the comprehensive plan could fail to receive the emphasis in allocation of funds and effort it must receive if it is to keep abreast of other aspects of the comprehensive plan.

Stocking Program for Stream Fisheries.

240. Another facet of the on-going programs of the state fish and game departments is the annual stocking of streams with trout. This is an absolute necessity in the type of habitat found in the majority of the Basin's trout streams, since, as previously mentioned, the low flow and often high temperatures which these streams undergo during summer and early fall precludes the carry-over of significant numbers of fish from one year to the next and limits natural reproduction.

241. The total stocking program presently supporting trout fishing in Genesee Basin streams includes 100,100 yearling trout at an annual cost of $25,000 and 22,100 fingerling trout, annual cost $8,800 - total annual cost, $33,800.

PROMOTING MAXIMUM USE OF WATERFOWL RESOURCES

Modification of Reservoir Design

242. According to the comprehensive plan, Site 7-2 on Black Creek is designed so that maximum level of beneficial storage will be at elevation 1711, at which the surface area will be 1715 acres. This is not the most desirable from the standpoint of improving waterfowl habitat.

243. At elevation 1711, the depth of water over existing marsh lands would eliminate 440 acres of fairly good waterfowl habitat which is presently used to the extent of 24,500 waterfowl days each year and which provides 300 days, annually, of waterfowl hunting opportunity. No significant amount of habitat for waterfowl would remain with a project of this design in place. An investment of $120,000 to $150,000 would be required to mitigate this loss by developing habitat of equal value at some other location or locations in the Basin where conditions were favorable.

244. On the other hand, designing a reservoir at Site 7-2 so that the maximum level of the beneficial storage pool did not exceed elevation 1705 would greatly improve the quality of the existing waterfowl habitat. Waterfowl use would increase to an estimated 103,800 days a year. Hunting use would increase to 1600 man-days a year. One hundred fifty ducklings would be produced each season. The annual value of habitat and hunting recreation would amount to $22,500 as compared to a comparable value of $4,800 without the project.

245. True - there would be a sizeable reduction in the surface area of the maximum beneficial storage pool - from 1715 to 1440 acres or a difference of 275 acres. Whether this would seriously reduce the number of general recreation visitations is not known, but it would reduce warm-water fishing opportunities by 16,500 man-days, annually, reducing annual fishery value by $49,500.

246. In view of the relatively greater divergence, however, between the supply and the demand for waterfowl hunting opportunity and between the supply and the need for waterfowl habitat to serve birds migrating through the Genesee Basin as compared to the divergence between the supply and demand for warm-water fishing opportunities, the decision in this case should be in favor of maximum development of the waterfowl resources and related recreational uses at Site 7-2.

Providing Access Facilities

247. Hunters need access facilities as do fishermen, although for their light weight boats or canoes, launching ramps are not required. Several of these same upland reservoir sites which could furnish waterfowl hunting opportunity were discussed in connection with access for fishing use (see paragraph 203 and table N-25). For Sites 7-1, 7-2, 17-12, and 17-24,

access facilities as indicated for fishing use will adequately serve the hunters. In the case of Site 19-7, no parking areas or boat ramps are necessary. For Sites 16-2 and 20-2, 1-acre parking facilities capable of taking care of 30-40 cars and trailers are needed, together with provisions for getting small boats and canoes to the water (no launching ramps). In connection with Sites 15-2 and 19-11, these facilities should be doubled.

248. Were the foregoing facilities provided at the reservoirs named, the resulting hunting opportunities as compared to without the project conditions would be as shown in table N-32. Also shown are the dollar values of hunter-day benefits and the annual cost of facilities. Although a total annual benefit of $26,400 based on a gain of 4,400 hunter days results in a net annual benefit amounting to $10,600, it is evident that the value of hunter use is not sufficient to justify the needed facilities in several instances. In fact, were it not that part of the cost of facilities had been charged off previously against fishery benefits, the total for the net annual benefit column would have come out a "negative" benefit, i.e., - $1,400. In spite of this, the scarcity of this type of recreational hunting activity and the quality of recreation it provides is considered to warrant construction of needed access facilities, with the deficit in benefits versus costs being absorbed by other fish and wildlife recreational activities in which a surplus of benefits exists.

Zoning for Maximum Use

249. Of the nine upland reservoir sites which, with adequate access facilities and parking areas, would provide waterfowl hunting opportunities, are listed in the comprehensive plan as single-purpose sites for recreation (Sites 16-2, 19-11, and 20-2). Three others are listed as being multiple-purpose sites for fish and wildlife and general recreation. Of the remaining three, one (Site 17-12) is multiple-purpose for water quality and fish and wildlife, another (Site 19-7) is multiple-purpose fish and wildlife and irrigation, and the third (Site 7-1) is designated as single-purpose fish and wildlife.

250. These impoundments range in size from 138 surface acres to 1440[1/]. Taking into account that waterfowl hunting is generally limited to a few locations on any one pond, that the range of duck loads - even with magnums - is quite restricted, and that waterfowl hunting generally takes place at a time when other water-related activities are at a minimum, it appears reasonable to assume that, even on those impoundments designated recreation only or those where fish and wildlife related activities share the stage with general recreation, waterfowl hunting would not be incompatible with other outdoor recreational activities. In addition, zoning regulations could be established to avoid any conflict which might appear imminent. Seasonal regulations might be most

1/ Site 7-2 at elevation 1705.

Table N-32 - Waterfowl hunting opportunities of upland reservoirs where access and parking facilities are provided, comprehensive plan, Genesee Basin, New York and Pennsylvania

NYSCD Region	Reservoir Site	Constr. Agency	Parking Areas No. Needed	Annual cost of Facilities	Hunter-Days Annually Without Project	Hunter-Days Annually With the Project	An.Value Without Project	An.Value With the Project	Annual Benefit in $	Net An. Benefit in $
2	Baker Crk.(7-1)	SCS	1	1/	-	100	-	$ 600	$ 600	$ 600
"	Black Crk (7-2)	"	3	1/	300	1,600	$1,800	9,600	7,800	7,800
1	Jaycox Crk(15-2)	"	2	$4,000	-	1,300	-	7,800	7,800	3,800
"	Erie Crk.(16-2)	"	1	2,000	-	200	-	1,200	1,200	- 800
"	Gates(Bebee)Cr.(17-12)	"	2	1/	-	600	-	3,600	3,600	3,600
"	Spring Crk.(17-19)	"	1	2,000	-	300	-	1,800	1,800	- 200
"	Gates Crk(17-24)	"	1	2,000	-	200	-	1,200	1,200	- 600
"	Black Crk (19-11)	"	2	4,000	-	300	-	1,800	1,800	-2,200
"	Red Crk. (20-2)	"	1	2,000	-	100	-	600	600	-1,400
Totals			14		300	4,700	$1,800	$28,200	$26,400	$10,600

1/ Cost charged against fishery values at this site.

practicable, limiting use to waterfowl hunting during October and November. It should also be possible, however, to permit other uses such as fishing even during the hunting season merely by reserving a portion or portions of the impoundment for hunting only. Motorboating during the waterfowl season should not be permitted on the lakes which furnish considerable waterfowl resting area during peak migration periods, because of the adverse effects caused by "rallying" the birds, even though it is unintentional.

251. It appears practicable, also, to develop values for waterfowl and other wildlife in a portion of some reservoirs while the emphasis in the remaining portion would be on fishing and general recreation. On this basis, the break-down at Site 15-2, for example would be 50-50, with 360 acres available for wildlife and 360 acres for other uses. Another example is Site 7-2, in which 440 acres (with maximum pool level at elevation 1105) would be primarily for wildlife habitat and related recreational uses; 1,000 acres for other forms of outdoor recreation.

Habitat Improvement Measures.

252. Because of its relative scarcity in the Basin, waterfowl habitat should be brought to maximum quality levels wherever it occurs in the upland reservoir projects and in the Canaseraga project at Groveland Flats. This would involve application of such management techniques as grassland-edge maintenance, development of nesting islands, and waterlevel control.

ENCOURAGING USE OF OTHER WILDLIFE RESOURCES

253. The need for hunting opportunities, as well as other recreational pursuits related to wildlife resources other than waterfowl, is expected to exceed the capabilities of the Genesee Basin within the next 50 years. It is important, therefore, that no lands be closed unnecessarily to such public uses. Some areas may need to be closed, of course, for reasons of public safety or project operations; such closures, however, can often be avoided and should be avoided through proper use regulations at appropriate seasons of the year. Lands acquired in connection with Sites 17-12, 17-19, and 19-7 in particular should be open to public hunting, as should lands acquired in connection with the 29 upland reservoirs serving the Ontario Lake Plain irrigated farms. Lands upon which the waterfowl habitat development would be made as a part of the Canaseraga project should be acquired in fee simple by the Government and be made available to the N.Y.S.C.D. Division of Fish and Game under a General Plan for Wildlife Management as provided by the Fish and Wildlife Coordination Act.

SUMMARY

254. Adoption of the means and measures for conserving and developing fish and wildlife resources and the uses related to them would considerably augment the benefits to be obtained from these resources through

the comprehensive plan. Many of these supplementary actions are essential to maintaining the value of existing resources or realizing their full potential for benefits. Others would develop additional benefits from or in conjunction with structural elements of the plan as described in Appendix "B". The application of the latter is most extensive in respect to the upland reservoir lakes and the effects are summarized in table N-33, together with related costs.

255. Table N-34 summarizes the impact of all modifications or additions to the comprehensive plan discussed in this chapter insofar as anticipated changes in man-days of recreational uses are concerned. Under the heading "Resource Use-Capability — Comprehensive Plan", the figures shown are for those resources now existing, which are to be conserved, and those which would be the result of structural measures in the comprehensive plan (see table N-19). The final columns of table N-33, therefore, indicate the total capability of the fish and wildlife resources of the Basin with the comprehensive plan as augmented by actions described in this chapter.

256. These modifications or additions to the comprehensive plan would add (and in the case of water quality improvement, have already added to a considerable degree) 36,900 more days of trout stream fishing opportunity (12,000 in Region 1, New York, and 24,900 in Region 2); 76,800 more days of trout lake fishing (36,600 in Region 1 and 40,200 in Region 2); 60,300 more days of warm-water stream fishing; 130,000 more days of warm-water lake fishing (67,200 in Region 1, 56,100 in Region 2, New York, and 6,700 in Pennsylvania); and 6,000 more man-days of waterfowl hunting opportunity, equally divided between the two New York regions.

257. The comprehensive plan, if it included the necessary structural and non-structural measures to permit maximum conservation and use of existing resources, and if the resources created by the planned structural improvements were further augmented by the measures whose effects are summarized in table N-34, would provide and maintain opportunities for 1,400,500 man-days of fishing and 1,625,100 man-days of hunting, of which 12,600 would be waterfowl-hunting days. The following tabulation permits comparison of these opportunities with anticipated needs in 1980 and 2020:

	Use Capability Man-days	1980 Needs Man-Days	% Net 1980	2020 Needs Man-Days	% Net 2020
Fisheries	1,400,500	2,060,000	68	3,900,000	36
Wildlife	1,625,100	1,300,000	125	2,300,000	71
Waterfowl	12,600	65,000	19	140,000	9

258. The net monetary values of fish and wildlife resources and related recreational opportunities as summarized in table N-35 are based upon

Table N-33 - Values of Upland Reservoir Fisheries augmented by d
Comprehensive Plan
Genesee Basin, New York and Pennsyl

State	Upland Reservoirs Single-Purpose F&W Site	Stream	Comprehensive Plan Trout	Comprehensive Plan Warm-water	Annual Value in $ Trout	Annual Value in $ Warm-water	With parking areas & ramps Added Use	With parking areas & ramps Net $ Benefit	With Fishing Piers Added Use	With Fishing Piers Net $ Ben
NYR-2	3-1	Chenunda Crk.	16,200		$ 64,800		5,400	$ 18,800		
" "	5-21	Brimmer Crk.	6,400		25,600		2,200	5,600	4,500	$ 14,700
" "	7-1	Baker Creek	9,500		38,000		3,200	10,000		
" "	9-3	Caneadea Crk.	4,400		17,600		1,400	2,800		
" "	10-3	Rush Creek	9,200		36,800		3,000	9,200		
Subtotal Region 2			45,700		$182,800		15,200	$46,400	4,500	$ 14,700
NYR-1	11-4	E. Koy Creek	6,900		27,600		2,300	6,400		
" "	13-1	No name	4,500		18,000		1,500	2,800	4,500	14,700
" "	13-22	Sugar Crk.	7,000		28,000		2,400	6,800		
" "	14-5	Beards Crk.	6,800		27,200		2,200	6,800	4,500	14,700
" "	17-1	Canadice Crk.	15,600		62,400		5,200	18,000		
" "	17-8	No name		12,900		38,700	4,300	10,100	4,500	10,200
Subtotal Region 1			40,800	12,900	$163,200	$ 38,700	17,900	$ 50,900	13,500	$ 49,600
Multi-Purpose FW-Rec.										
NYR-2	3-4	Marsh Creek		9,400		28,200	3,100	6,500	4,500	10,200
" "	7-2	Black Creek		102,900		308,700	34,300	94,500	36,000	81,600
" "	8-13	Wigwam Crk.	17,000		68,000		5,700	20,000		
Subtotal Region 2			17,000	112,300	$68,000	$336,900	43,100	$121,000	40,500	$91,800
NYR-1	13-6	Sugar Crk.	18,000		72,000		6,100	21,200	4,500	14,700
" "	17-24	Gates Creek		15,400		46,200	5,200	12,800	4,500	10,200
Subtotal Region 1			18,000	15,400	$72,000	$46,200	11,300	$ 34,000	9,000	$24,900
Multi-Purpose I-FW										
NYR-1	11-2	E. Koy Creek	25,100		$100,400		8,400	$ 30,800		
" "	19-7	Bigelow Crk.		9,100		$ 27,300	3,100	2,500	4,500	$10,200
Multi-Purpose WQ-FW										
NYR-1	17-12	Gates(Bebee) Crk.		30,000		$ 90,000	10,000	$ 25,200	4,500	$10,200
Multi-Purpose FP-FW										
NYR-1	17-7	Mill Creek	9,300		37,200		3,100	9,600		
Single-Purpose: Rec.										
Pa.	1-5	No name		6,800		10,200			4,500	5,700
NYR-2	5-1	Vandermark Crk.		8,200		24,600	2,800	5,600	4,500	10,200
" "	10-2	No name	3,800		15,200		1,200	2,000	4,500	14,700
" "	14	No name	3,000		12,000		1,000	2,000		
Subtotal Region 2			6,800	8,200	$27,200	$24,600	5,000	$ 9,600	9,000	$24,900
Single-Purpose: I										
NYR-1	17-19	Spring Creek		15,000		70,800	5,000	8,200	9,000	20,400
Totals			162,700	209,700	$650,800	$644,700	22,100	$338,200	94,500	$236,700
Region 1, N.Y.			(93,200)	(82,400)	(372,800)	(273,000)	T(31,200)	(112,500)	(13,500)	(144,100
							W(27,600)	(48,700)	(27,000)	(61,200
Region 2, N.Y.			(69,500)	(120,500)	(278,000)	(361,500)	T(23,100)	(70,400)	(9,000)	(29,400
							W(40,100)	(106,600)	(45,000)	(102,000
Pennsylvania				(6,800)		(10,200)				

1/ Pre-impoundment spp.control is a once-only job: total cost for entire plan = $45 per annum @ 3 1/8 for 50 years)
Not included in Mgmt. Cost.

d Reservoir Fisheries augmented by development and management measures
Comprehensive Plan
Genesee Basin, New York and Pennsylvania

ramps Benefit	With Fishing Piers: Added Use	With Fishing Piers: Net $ Benefits	Pre.Imp. Spp.Control	An. Cost of Stocking	An. Cost of Weed Control	Total An. Benefits	Total An. Mgmt. Cost	Net Annual Fish Benef.
800			$ 1/			$ 83,600		$ 83,600
600	4,500	$ 14,700	25	$ 1,200	$ 1,300	45,900	$ 2,500	43,400
000						48,000		48,000
800						20,400		20,400
200						46,000		46,000
400	4,500	$ 14,700	$ 25	$ 1,200	$ 1,300	$ 243,900	$ 2,500	$241,400
400						34,000		34,000
800	4,500	14,700	75	1,000		35,500	1,000	34,500
800						34,800		34,800
800	4,500	14,700	25	1,500		48,700	1,500	47,200
000						80,400		80,400
100	4,500	10,200				59,000		59,000
900	13,500	$ 49,600	$ 100	$ 2,500		$ 292,400	$ 2,500	$289,900
500	4,500	10,200				44,900		44,900
500	36,000	81,600				484,800		484,800
000						88,000		88,000
000	40,500	$91,800				$617,700		$617,700
200	4,500	14,700	245	4,000	3,600	107,900	7,600	100,300
800	4,500	10,200	45	20		69,200		69,200
000	9,000	$24,900	$290	$ 4,020	$ 3,600	$177,100	$ 7,600	$169,500
800						$131,200		$131,200
500	4,500	$10,200				40,000		40,000
200	4,500	$10,200				$125,400		$125,400
600						46,800		46,800
	4,500	5,700	290	1,700		15,900	1,700	14,200
600	4,500	10,200	295	2,200		40,400	2,200	38,200
000	4,500	14,700	15	900		31,900	900	31,000
000			15	1,100		14,000	1,100	12,900
600	9,000	$24,900	$325	$ 5,900		$86,300	$ 5,900	$ 96,300
200	9,000	20,400	110	400		99,400	400	99,000
200	94,500	$236,700	$1,140 1/	$ 14,020	$ 4,900	$ 1,876,100	$18,900	$ 1,857,200
500)	(13,500)	(44,100)	(345)	(6,500)	(3,600)	(578,300)	(10,100)	(568,200)
700)	(27,000)	(61,200)	(155)	(420)		(334,000)	(400)	(333,600)
400)	(9,000)	(29,400)	(55)	(3,200)	(1,300)	(377,800)	(4,500)	(373,300)
600)	(45,000)	(102,000)	(295)	(2,200)		(570,100)	(2,200)	(567,900)
			(290)	(1,700)		(15,900)	(1,700)	(14,200)

50 years)

Table N-34 - Benefits in terms of user-days resulting from applying supplementary means and measures to improve Fish and Wildlife aspects of the comprehensive plan, Genesee Basin, New York and Pennsylvania

New York	Resource Use Capability Comprehensive Plan 1980 Fish	Wildlife	With Provision for Access and Parking Facilities Fish	Wildlife	With Fishing Piers Provided	With Pollut. Streams Reclaimed	With Maximum Elev. of Site 7-2 at 1105 Fish	Wildlife	Total Use with Suggested Modifications of Plan Fish	Wildlife
Region 1, NYSDFG										
Trout Streams	70,000		7,200			4,800 2/			82,000	
Trout Lakes	102,300		23,100		13,500				138,900	
Warm-water Streams	6,000					60,300 3/			66,300	
Warm-water Lakes	656,400		40,200		27,000				723,600	
Hunting										
Waterfowl		6,300		3,000						9,300
Other		983,300								983,300
Subtotals: Region 1	834,700	989,600	70,500	3,000	40,500	65,100			1,010,800	992,600
Bird-Watching-Region 1 1/		(37,800)								(37,800)
Ontario Lake Plain Hunting		- 20,300								- 20,300
Region 2, NYSDFG										
Trout Streams	22,000		7,200			17,700 4/			46,900	
Trout Lakes	111,500		31,200		9,000				151,700	
Warm-water Streams	1,000								1,000	
Warm-water Lakes	120,500		27,600		45,000		- 16,500		176,600	
Hunting										
Waterfowl		300		1,700				1,300		3,300
Other species		649,500								649,500
Subtotals, Region 2	255,000	649,800	66,000	1,700	54,000	17,700	- 16,500	1,300	376,200	652,800
Subtotals - New York										
Fishing	1,089,700		136,500		94,500	82,800	- 16,500		1,387,000	
Hunting										
Waterfowl		6,600		4,700				1,300		12,600
Other species(in Basin)		1,632,800								1,632,800
Lake Plain Hunting		- 20,300								- 20,300
Pennsylvania										
Warm-water Lakes	6,800		2,200		4,500				13,500	
Totals	1,096,500	1,619,100	138,700	4,700	99,000	82,800	- 16,500	1,300	1,400,500	1,625,100

1/ Do not add in figuring subtotals or totals.

2/ 1300 on streams yet to be reclaimed.

3/ 52,300 on streams yet to be reclaimed.

4/ 100 " " " " " "

Table N-35 - Annual $ Values of Benefits from Comprehensive Plan over and above existing resources, as augmented by specific measures for management and development
Genesee Basin, New York and Pennsylvania

Source of Benefits	NYSDFG Region 1		NYSDFG Region 2		Pennsylvania		Total $
Fisheries	Trout	Warm-Water	Trout	Warm-Water	Trout	Warm-Water	Fisheries
Impoundments							
Single-Purpose F&W	$230,900	$ 59,000	$241,400				$531,300
Multi-Purpose							
Recreation F&W	100,300	69,200	88,000	$529,700			787,200
Irrigation F&W	131,200	40,000					171,200
Water Quality F&W		125,400					125,400
Flood Protection F&W	46,800						46,800
Other Single-Purposes							
Recreation			43,900	38,200		$14,200	96,300
Irrigation		99,000					99,000
Subtotals	$509,200	$392,600	$373,300	$567,900		$14,200	$1,857,200
Streams							
Reclaimed as of Nov. '69 1/	13,900	24,100	70,400				108,400
With quality restored	5,500	157,100					162,600
With access & parking	28,800		28,800				57,600
Subtotals	$ 48,200	$181,200	$ 99,200				$328,600
Less cost of An. Stocking	- 25,000		- 8,800				- 33,800
Total Net Fishery Benefits	$532,400	$573,800	$463,700	$567,900		$14,200	$2,152,000

Wildlife	NYSCDFG Region 1			NYSDFG Region 2		Ontario	
Impoundments	Habitat	Hunting	Watching	Habitat	Hunting	Lake Plain	Totals
Waterfowl							
Canaseraga Project	$170,700	$ 22,800	$ 11,400				$ 204,900
Upland projects							
Single-Purpose FW				$ 500	$ 600		1,100
Multi-Purpose R-FW	10,200	3,800		10,300	7,800		32,100
" WQ-FW	4,000	3,600					7,600
Single-Purpose: R		- 4,400					- 4,400
" " I		- 200					- 200
Subtotal Net Waterfowl Benefits	$184,900	$ 25,600	$ 11,400	$10,800	$ 8,400		$ 241,100
Other Wildlife							
Big Game							
Multi-purpose WQ-FW		$- 1,800					- 1,800
Upland Game							
Multi-purpose WQ-FW		- 1,800					- 1,800
" " I-FW		- 300					- 300
Single purpose I		- 600				- 40,600	-41,200
Subtotal Net Benefits - Other Wildlife		- 4,500				- 40,600	$ -45,100
Totals - Wildlife	$184,900	$ 21,100	$ 11,400	$10,800	$ 8,400	$-40,600	$ 196,000

1/ Indirectly as part of Comprehensive Plan.

resources brought into being or improved by the project over and above the level of resource abundance and use-capability which is expected to exist without implementation of the comprehensive plan. Total net benefits, if the plan incorporates the proposed improvements, will amount to 2,152,000 annually, from fisheries and $196,000 from wildlife resources.

259. In conclusion, the comprehensive plan described in Appendix "B" represents a very real effort on the part of many to pool their knowledge and skills to develop a plan which would insofar as possible meet the various needs and provide various avenues of economic and cultural development of the Genesee Basin. In spite of limitations which caused plan formulation procedures to be far from ideal, it appears that a plan has been developed which will go a long way toward reaching the objectives of the Genesee Basin Comprehensive Study.

260. In a sense, however, the plan is a stack of cards which can remain stacked only if one assumes that there is authority to carry it out and funds to finance it. It is obvious that, insofar as fish and wildlife is concerned, the benefits are dependent in large part upon construction of single-purpose or multiple-purpose upland reservoirs. Estimated cost of the 35 upland reservoir sites is $28,763,000 of which the estimated Federal share would be $12,737,000. From the standpoint of meeting needs related to fish and wildlife, those reservoirs should be constructed and in operation by 1980. In ten years — prorated, the cost amounts to $2.9 million a year, approximately. Furthermore, there is no authority under existing law for Federal participation except in the case of 5 reservoirs, other than under the Acts providing for fish and wildlife restoration or under the land and water resources Act administered by the Bureau of Outdoor Recreation. Funds under these Acts would not be of sufficient magnitude to carry out much of a construction program.

261. On the other hand, by Federal standards, the amounts needed to implement the plan are relatively small and certainly the benefits to the people of the Basin and to the Buffalo-Rochester metropolitan area appear sufficiently large and important that special authorization should be given to the Secretary of Agriculture to go beyond the present restrictions of Public Law 566 and participate in carrying out all upstream aspects of the comprehensive plan which need to be installed to meet the needs identified for 1980.

Attachment N-A. List of Reports concerning the Fish and Wildlife Resources of the Genesee River Basin, New York and Pennsylvania.

1. February 1946 — A preliminary Report on Fish and Wildlife Problems in relation to the Mount Morris Flood Control Reservoir.

2. January 1962 — Fish and Wildlife Reconnaissance Report on Red Creek Watershed Project, Monroe County, New York.

3. April 1962 — Conservation and Development Report on Oatka Creek Flood Control Project, Warsaw, New York.

4. June 1962 — Preliminary Report on Fish and Wildlife Resources of the Canaseraga Basin, New York, in Relation to Flood Control on Canaseraga Creek and Genesee Basin.

5. October 1962 — Fish and Wildlife Reconnaissance Report on the Canaseraga Creek Small Watershed, New York.

6. June 1963 — Report to County Planning Council on Conservation and Development of Fish and Wildlife Resources, Monroe County, New York.

7. July 1963 — Preliminary Report on Fish and Wildlife Resources, Genesee Basin, New York and Pennsylvania.

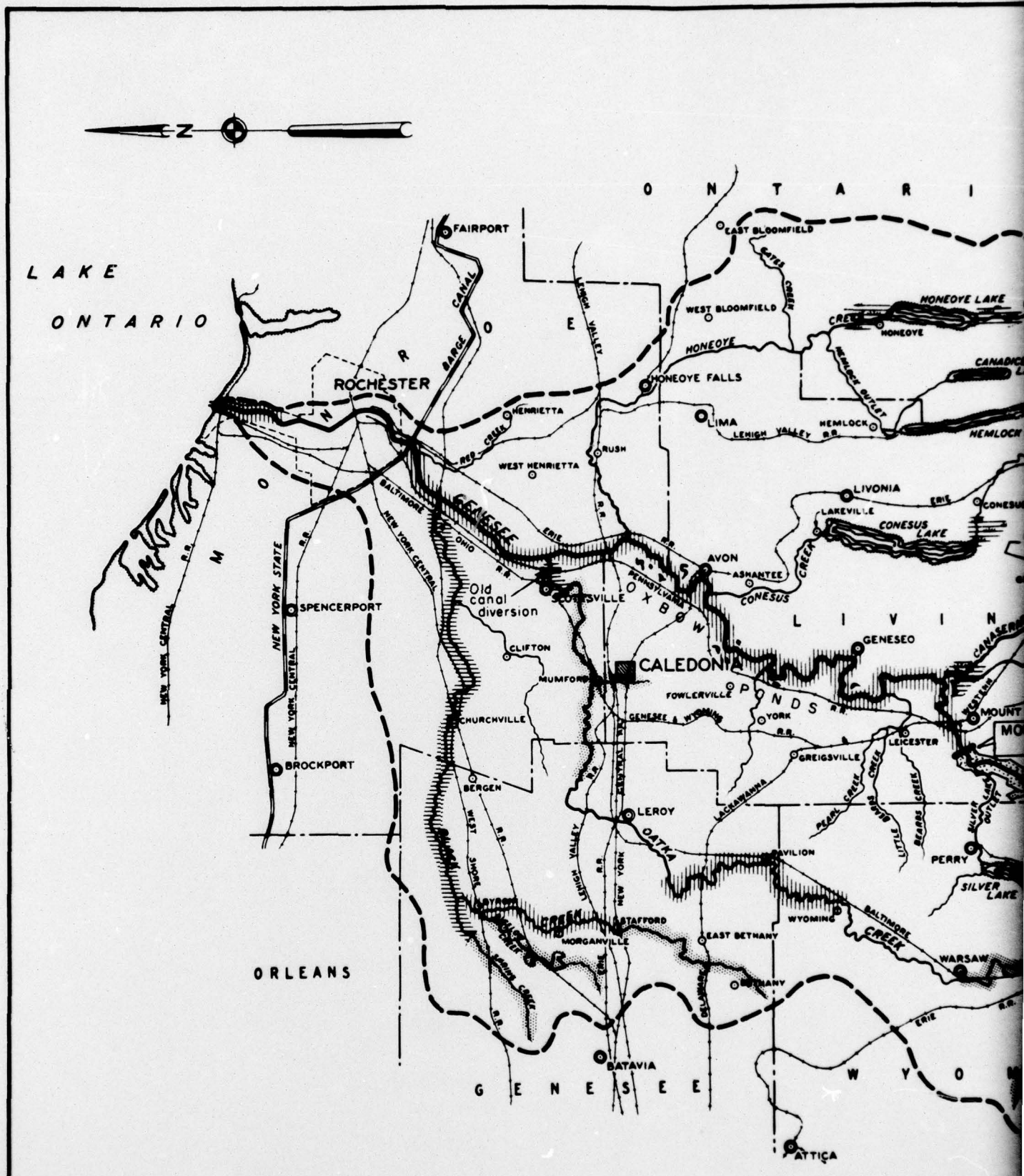
8. April 1964 — Conservation and Development Report on Red Creek in the vicinity of Rochester, New York.

9. December 1964 — Interim Report on Fish and Wildlife Resources Based on Preliminary Evaluation of Tentative Impoundment Sites in Genesee River Basin, New York and Pennsylvania.

Attachment N-B
Reservoir Sites Which Might Furnish Needed Low-Flow Augmentation, Plus Reservoir Fishery or Waterflow Values, Genesee Basin, New York and Pennsylvania

NYSCD Region	Reservoir Site	Surface Acres	Stream Augmented	Stream Fishery	Reservoir Fishery or Waterfowl	Potential use Fisherman-Days	
2	2-6	?	Cryder Ck.	Trout	?	?	
2	2-3	145	Cryder Ck.	Trout	Trout	14,500	
2	3-1	216	Chenunda Cr.	Trout	Trout	21,600	
2	3-2	?	Chenunda Cr.	Trout	?	?	
2	8-13	227	Wigwam Cr.	Trout	Trout	22,700	
1	17-7	124	Mill Creek	Trout	Trout	12,400	*Honeoye Creek*
1	11-2	92	East Koy Cr.	Trout	Trout	9,200	
1	11-4	92	East Koy Cr.	Trout	Trout	9,200	
1	13-11	57	Newville Cr.	Trout	Trout	5,700	Would also augment Canaseraga Cr.
1	13-8A	?	Bradner Cr.	Trout	?	?	
1	13-24	31	Bradner Cr.	Trout	Trout	3,100	
1	13-6	243	Sugar Cr.	Trout	Trout	24,300	
1	13-22	94	Sugar Cr.	Trout	Trout	9,400	
1	13-10	75	Canaseraga	Trout	Trout	7,500	
1	13-27	11	Canaseraga	Trout	Trout	1,100	
1	13-13	150	Canaseraga	Trout	Trout	15,000	
2	9-3	72	Caneadea Cr.	Trout	Trout	7,200	
2	4-2	?	Dyke Cr.	Trout	?	?	
2	4-4	?	Dyke Cr.	Trout	?	?	
2	4-5	?	Dyke Cr.	Trout	?	?	
1	18-6	158	Oatka Cr.	Warmwater	Warmwater	12,640	
1	18-5	138	Oatka Cr.	Warmwater	Waterfowl		
1	18-8	170	Oatka Cr.	Warmwater			Mainly Mun. & Indus. Water Supply
1	18-9	73	Oatka Cr.	Warmwater		6,400	Mainly for Low-Flow Augmentation
2	5-14	?	Gordon Brook	Warmwater	?	?	Lower reaches of Gordon Brook
2	7-3	? 1/	Angelica Cr.	Trout	?	?	Marginal Trout stream Fishery
2	7-7	313 2/	Angelica Cr.	Trout	Trout	31,300	Marginal Trout stream Fishery
2	7-2	1,180 2/	Fry Creek	Warmwater	Warmwater	103,100	also waterfowl. CE Site No. 5
1	17-8	215	Honeoye Cr.	Warmwater	Warmwater	17,200	
1	17-7	124	Honeoye Cr.	Trout	Trout	12,400	
1	17-12	500	Honeoye Cr.	Warmwater	Waterfowl	----	
2	Portage(CE-10)	4,100	Genesee R.	Warmwater	Warmwater	400,000	
2	Stannard(CE-1)	1,510	Genesee R.	Trout	Trout	150,000	
1	13-5	210 3/	Canaseraga	Trout	Trout	21,000	Upper reaches, Canaseraga Crk.
1	13-1	60	Canaseraga	Trout	Trout	6,000	" " " "
2	5-18	60	Brimmer Brk.	Trout	Trout	6,000	
2	5-21	86	Brimmer Brk.	Trout	Trout	8,600	
2	10-3	122	Rush Crk.	Trout	Trout	12,200	
2	10-4	178	Rush Crk.	Trout	Trout	17,800	
2	10-7	160	Rush Crk.	Trout	Trout	16,000	
2	6-3	36	Van Campen Cr.	Warmwater	Warmwater	2,800	
2	6-5	220	Van Campen Cr.	Warmwater	Trout	22,000	
2	6-6	?	Van Campen Cr.	Warmwater	?	?	
2	6-7	?	Van Campen Cr.	Warmwater	?	?	
1	17-11	109	Gates Crk.	Warmwater	Waterfowl	----	Const. Costs Prohibitive
1	13-2	?	Canaseraga	Trout	?	?	Upper Reaches, Canaseraga Cr.
1	13-3	48	Canaseraga	Trout	Trout	4,800	" " " "

1/ CE site No. 4 might also serve to augment flow of Angelica Cr.
2/ Might also serve to augment Black Cr.
3/ See also sites 13-2, 13-3, 13-24, & 13-8A



UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE
BOSTON, MASS

2

LEGEND
WARM-WATER STREAM FISHERY
COLD-WATER STREAM FISHERY
WATERFOWL HABITAT
STATE MANAGED TROUT FISHERY
NAPLES
NYDFG REGION 1
REGION 2 NYDFG
WATERSHED BOUNDARY
HONEOYE LAKE
HONEOYE
CANADICE LAKE
HEMLOCK OUTLET
HEMLOCK
HEMLOCK LAKE
SPRINGWATER
WAYLAND
PERKINSVILLE
SOUTH DANSVILLE
HORNELL
LIVONIA
LAKEVILLE
CONESUS
CONESUS LAKE
DANSVILLE
STONY BROOK STATE PARK
Groveland flats
Pooges' Hole
GROVELAND
CANASERAGA
ALFRED
ANDOVER
GENESEO
SONYEA
MOUNT MORRIS
MOUNT MORRIS DAM
LEICESTER
GREIGSVILLE
NUNDA
DALTON
SWAIN
Birdsall Swamp
BIRDSALL
WEST ALMOND
PHILLIPS CREEK
WELLS
ALLEN CENTER
ALLEN LAKE
ANGELICA
BELMONT
PERRY
SILVER LAKE
LETCHWORTH PARK
Wolf Cr.
HUNT
PORTAGE
PORTAGEVILLE
WYOMING
CASTILE
SILVER SPRINGS
WARSAW
LAMONT
GAINESVILLE
FILLMORE
BELFAST
ROCKVILLE LAKE
FRIENDSHIP
PIKE
HOUGHTON
CANEADEA
CRAWFORD
BLACK CREEK
BLISS
NYDFG REGION 1
REGION 2 NYDFG
RUSHFORD LAKE
RUSHFORD
CENTERVILLE
CUBA
CUBA LAKE
ATTICA
L I V I N G S T O N
S T E U B E N
A L L E G A N Y
W Y O M I N G
C A T T A R A U G U S
SCALE OF MILES
3 2 1 0 3 6 9

3

LEGEND

-WATER STREAM FISHERY

WATER STREAM FISHERY

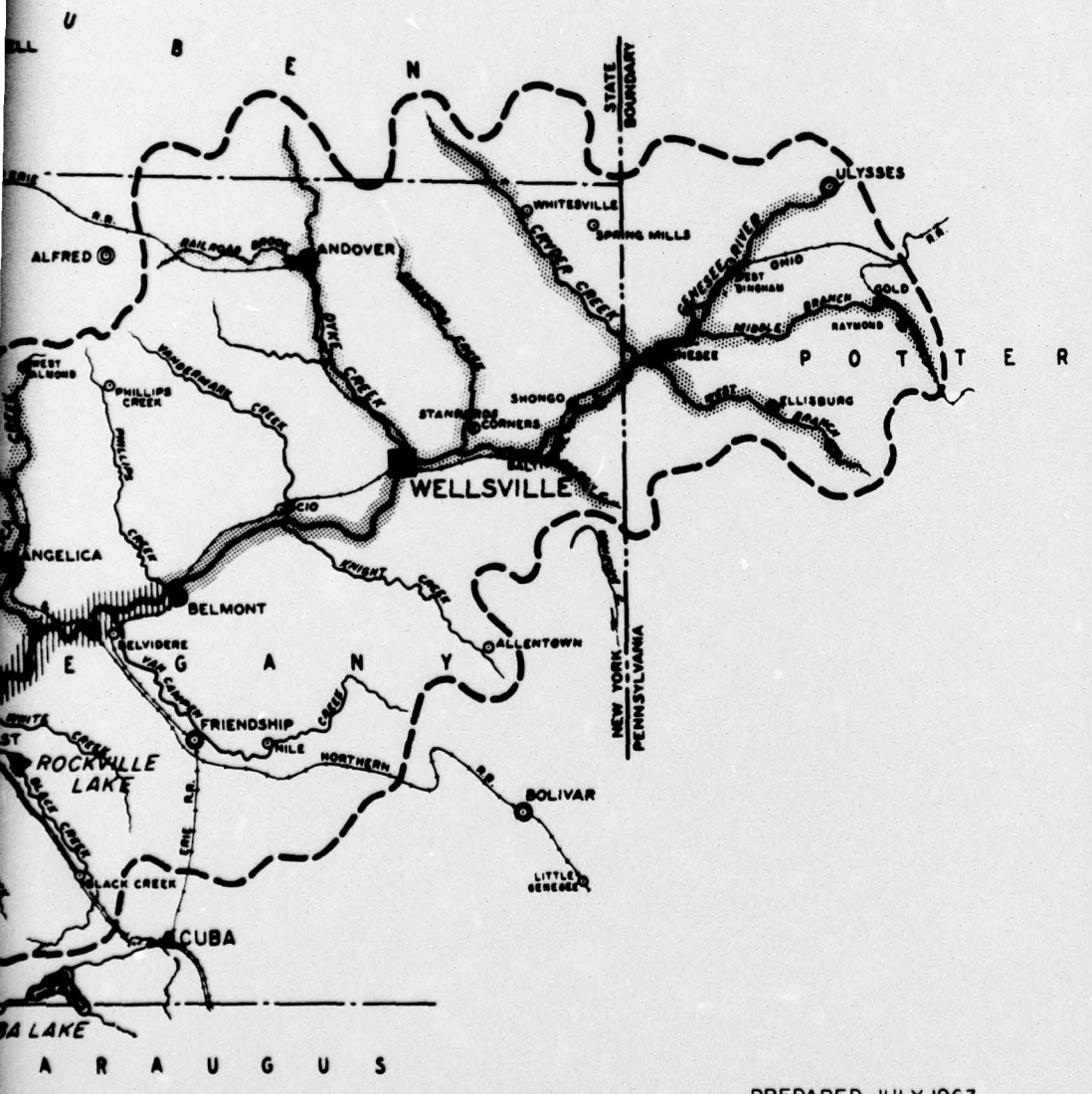
FOWL HABITAT

MANAGED TROUT FISHERY

PLATE N-I

GENESEE BASIN
NEW YORK & PENNSYLVANIA
SHOWING

FISH AND WILDLIFE AREAS OF SIGNIFICANCE IN WATER RESOURCES PLANNING



PREPARED JULY 1963
REVISED OCTOBER 1969

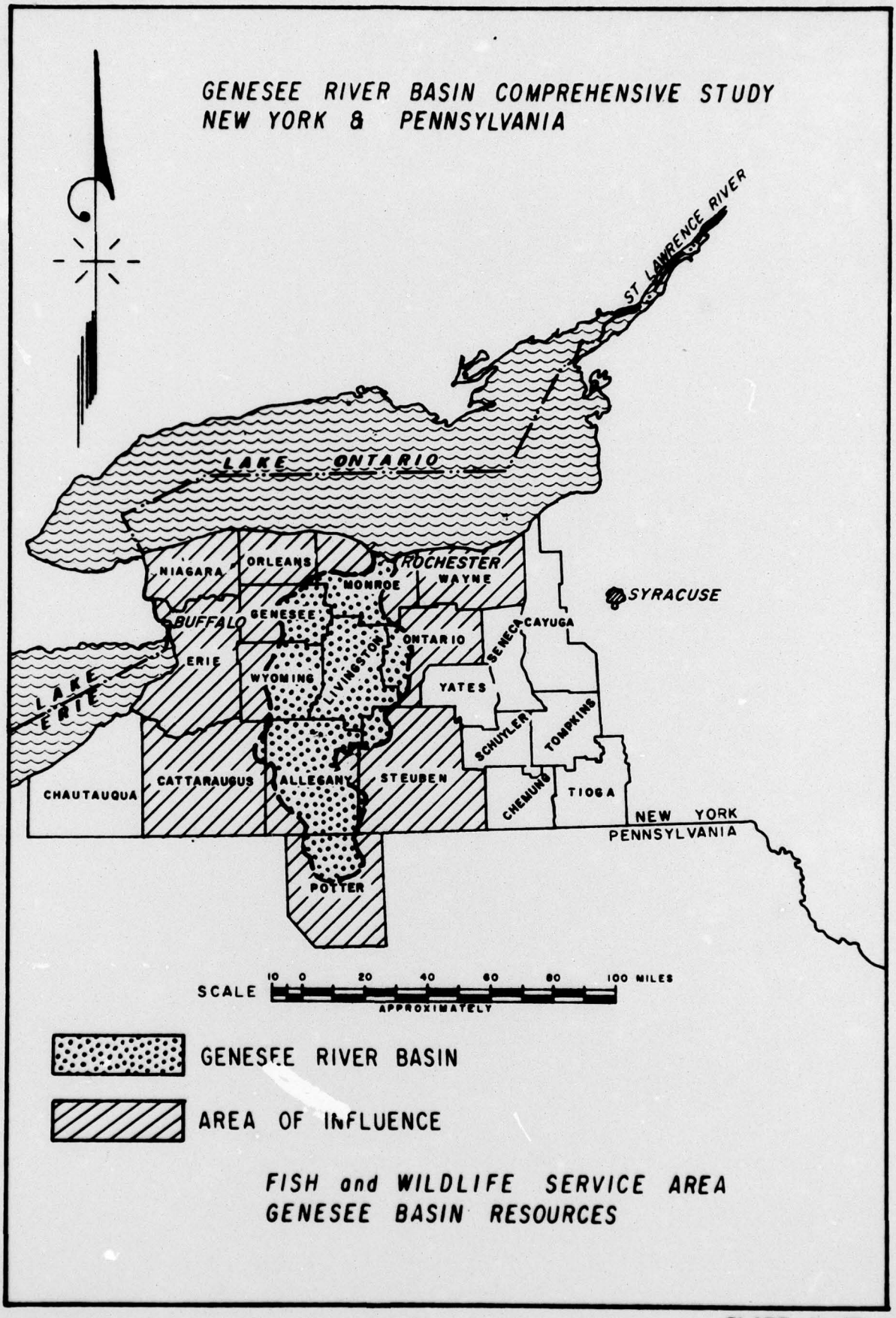
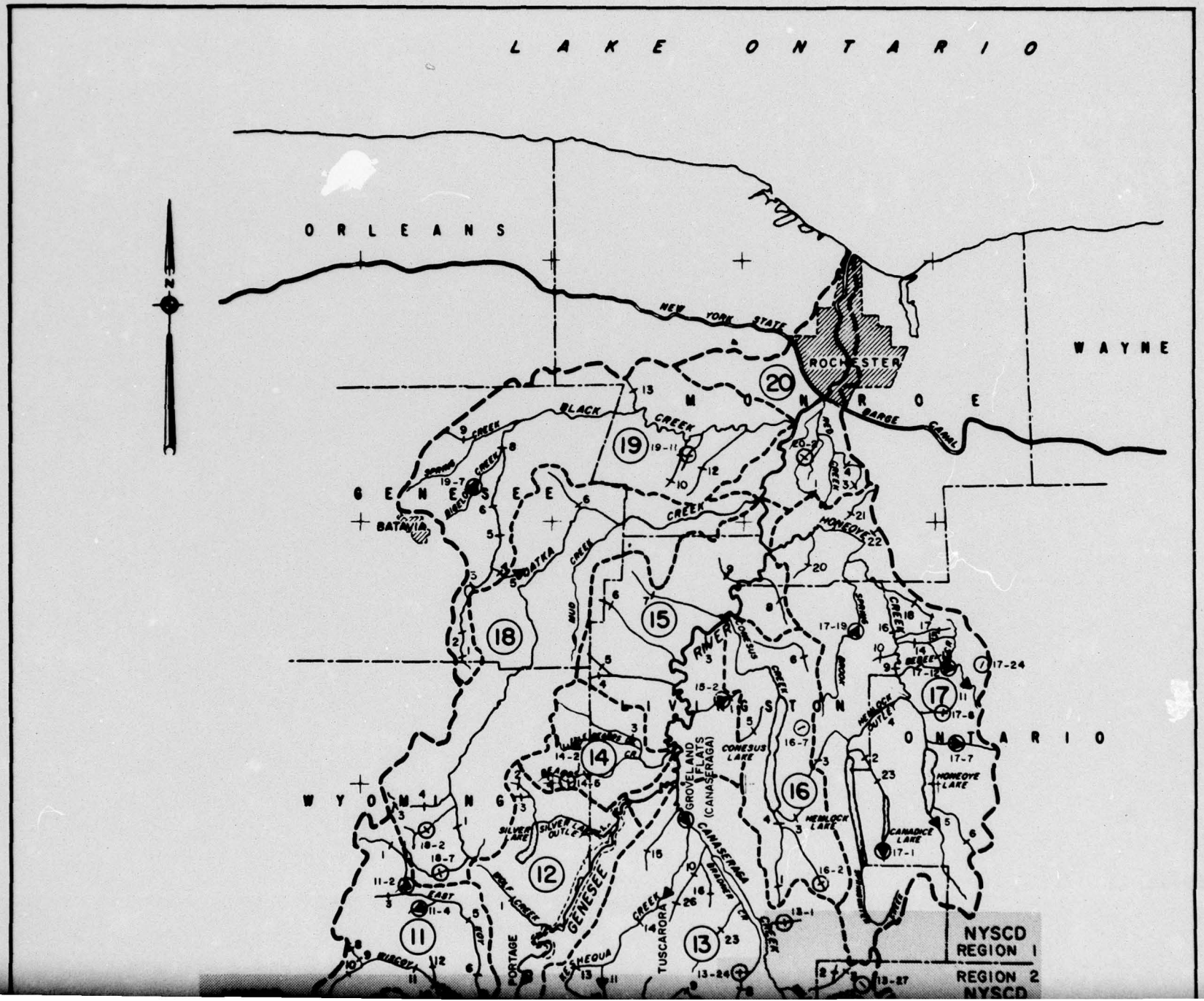

GENESEE RIVER BASIN COMPREHENSIVE STUDY
NEW YORK & PENNSYLVANIA
ST LAWRENCE RIVER
LAKE ONTARIO
NIAGARA
ORLEANS
MONROE
ROCHESTER
WAYNE
SYRACUSE
BUFFALO
GENESEE
ONTARIO
SENECA
CAYUGA
ERIE
WYOMING
LIVINGSTON
YATES
LAKE ERIE
SCHUYLER
TOMPKINS
CHAUTAUQUA
CATTARAUGUS
ALLEGANY
STEUBEN
CHEMUNG
TIOGA
NEW YORK
PENNSYLVANIA
POTTER
SCALE
10 0 20 40 60 80 100 MILES
APPROXIMATELY
GENESEE RIVER BASIN
AREA OF INFLUENCE
FISH and WILDLIFE SERVICE AREA
GENESEE BASIN RESOURCES

PLATE N-II


LAKE ONTARIO
ORLEANS
NEW YORK STATE
ROCHESTER
WAYNE
MONROE
BARGE CANAL
GENESEE
BATAVIA
WYOMING
LIVINGSTON
ONTARIO
GROVELAND FLATS (CANASERAGA)
CONESUS LAKE
HEMLOCK LAKE
CANADICE LAKE
HONEOYE LAKE
SILVER LAKE
GENESEE
TUSCARORA
PORTAGE
KESHEQUA
BLACK CREEK
CONESUS CREEK
HONEOYE CREEK
CANASERAGA CREEK
NYSCD REGION 1
REGION 2 NYSCD

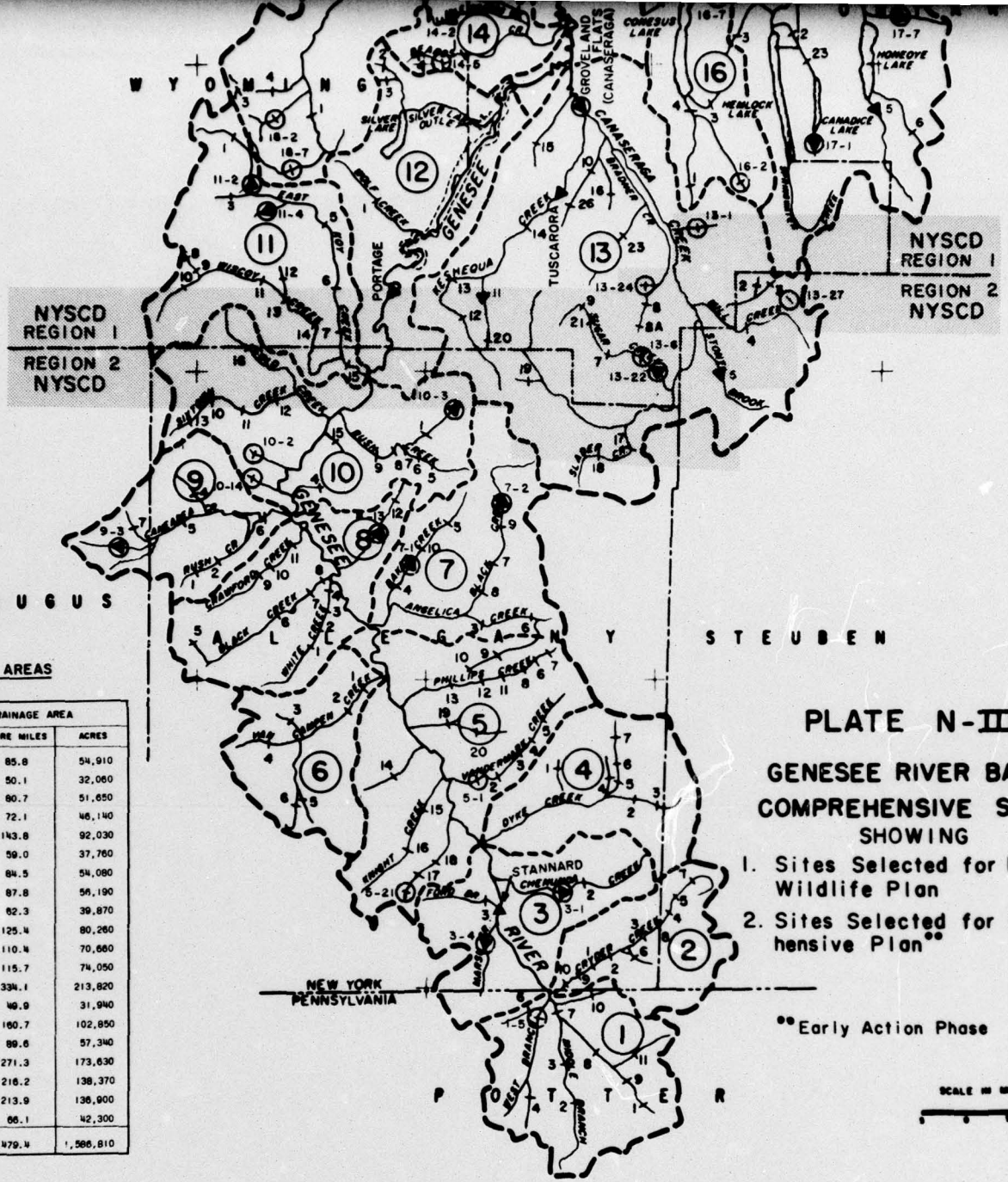


PLATE N-III

GENESEE RIVER BASIN COMPREHENSIVE STUDY

SHOWING

1. Sites Selected for Fish and Wildlife Plan ▲
2. Sites Selected for Comprehensive Plan** ⊖

**Early Action Phase

SUBWATERSHED AREAS

SUBWATERSHED		DRAINAGE AREA	
NUMBER	NAME	SQUARE MILES	ACRES
1	GENESEE - SOUTH	85.8	54,910
2	CRYDER CREEK	50.1	32,060
3	GENESEE - CHENUNDA	80.7	51,650
4	DYKE CREEK	72.1	46,140
5	GENESEE - VANDERMARK	143.8	92,030
6	VAN CAMPEN CREEK	59.0	37,760
7	ANGELICA CREEK	84.5	54,080
8	GENESEE - SOUTH BLACK	87.8	56,190
9	CANEADEA CREEK	62.3	39,870
10	GENESEE - COLD CREEK	125.4	80,260
11	WISCOY CREEK	110.4	70,660
12	SILVER LAKE OUTLET	115.7	74,050
13	CANASERAGA CREEK	334.1	213,820
14	BEARDS CREEK	49.9	31,940
15	GENESEE - GENESEO	160.7	102,850
16	CONESUS LAKE	89.6	57,340
17	HONEOYE CREEK	271.3	173,630
18	OATKA CREEK	216.2	138,370
19	BLACK CREEK	213.9	136,900
20	GENESEE - ROCHESTER	66.1	42,300
TOTAL		2,479.4	1,586,810

BASIN MAP PREPARED BY U.S. ARMY ENGINEERS, BUFFALO, N.Y. JUNE 1964 - SUBWATERSHED DATA COMPILED BY U.S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE - DESIGNATION OF IMPOUNDMENT SITES BY U.S. DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE, BUREAU OF SPORT FISHERIES AND WILDLIFE, BOSTON, MASSACHUSETTS - FIELD INVESTIGATIONS OF INDIVIDUAL RESERVOIR SITES WERE CONDUCTED IN COOPERATION WITH PERSONNEL OF THE NEW YORK STATE CONSERVATION DEPARTMENT (REGIONS I AND II) AND THE PENNSYLVANIA FISH AND GAME COMMISSIONS. - OCTOBER 1964.

REVISED OCTOBER 1969

PLATE N-III